the Illinois Technograph

NOVEMBER, 1949

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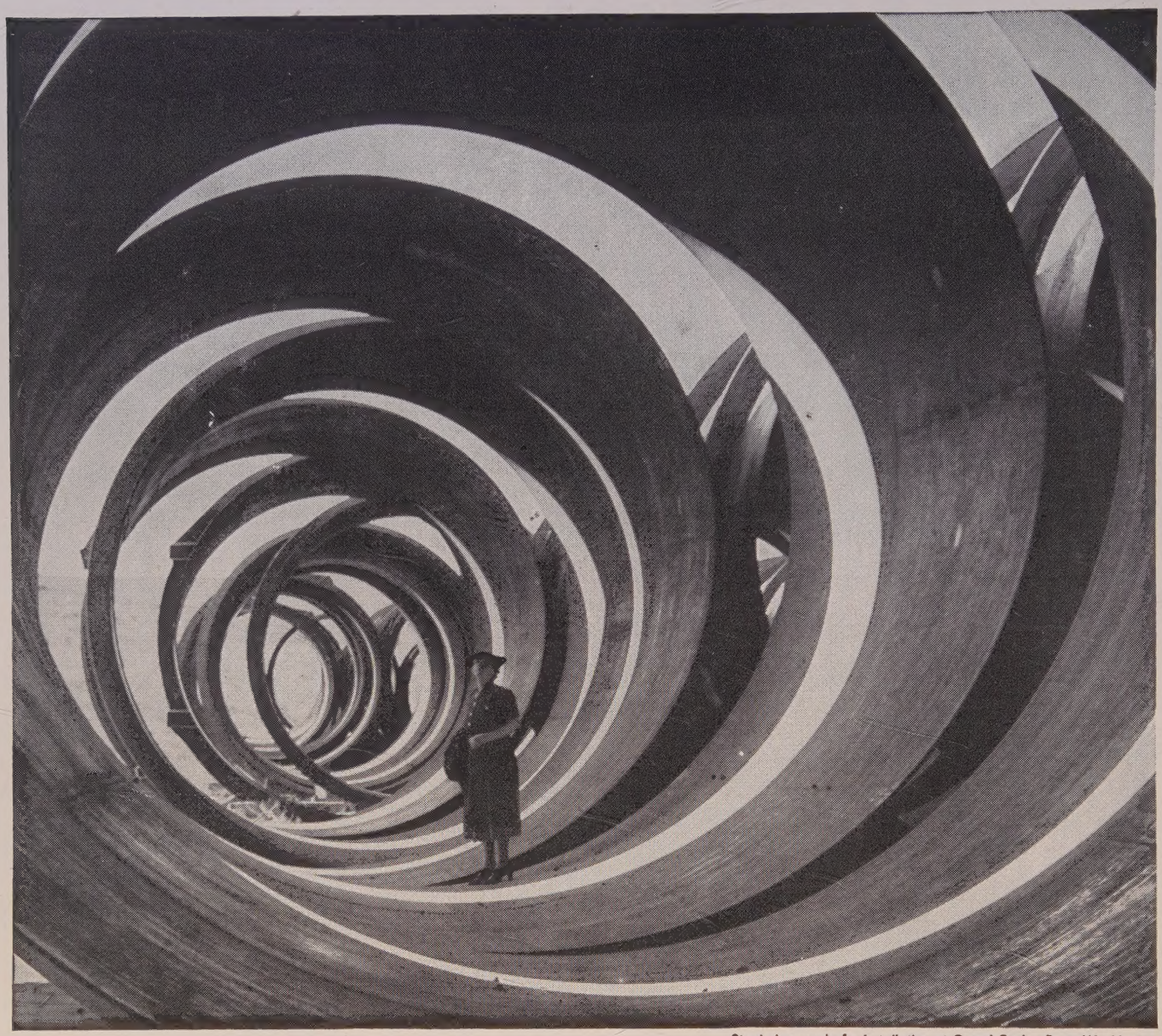
TWENTY-FIVE CENTS

Want to make a river run uphill?



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It adds up to a tremendous task for America's steelmakers. And it's only one of steel's many tasks that will utilize the services of thousands of trained men, for steelmaking today is a precision operation. Chemical and metallurgical laboratories have assumed an importance equal to that of roaring blast furnaces and open hearths.

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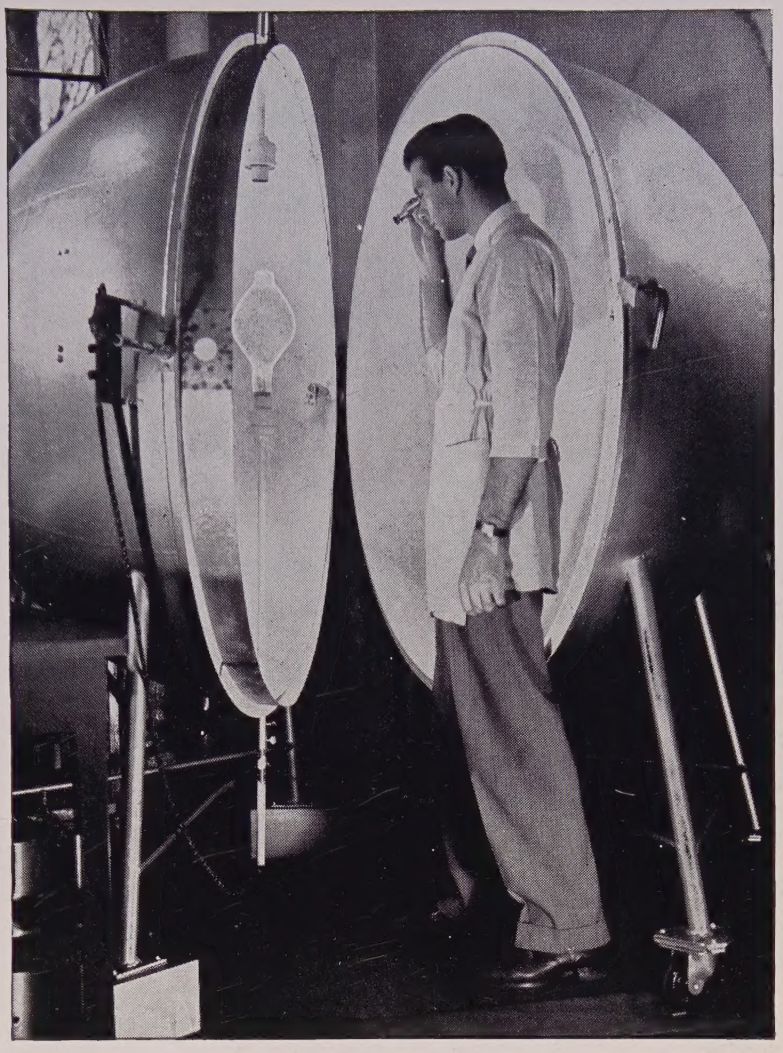
VISION...

Vital Ingredient of a Name



What is vision? An inspired revelation? Or . . . the faculty or sense of sight?

Pick your own definition. They're both important in your future. With Westinghouse, they are both important, too.

Even before the time George Westinghouse dramatically proved the superiority of a-c power distribution, climaxed by his daring demonstration at the Columbian Exposition in 1893, the vision (inspired revelation) of Westinghouse had been repeatedly demonstrated. It's a vision that's burned brightly through the years.

In this bold challenge to status quo, Westinghouse staked his name and future on a conviction that better, cheaper power could be delivered with alternating current.

The same spirit of enterprise by the Westinghouse organization has repeatedly broadened the usefulness and diverse application of electric lighting.

For example, the quartz tube filled with Krypton with a brilliance nine times greater than the sun; the bacteria-killing Sterilamp; fluorescent and mercury-vapor sun lamps; talking lamps; heat lamps; lamps to produce black light . . . and on and on through the 10,000 different types and sizes . . . plus a multitude of electronic tubes with equally versatile and vital applications.

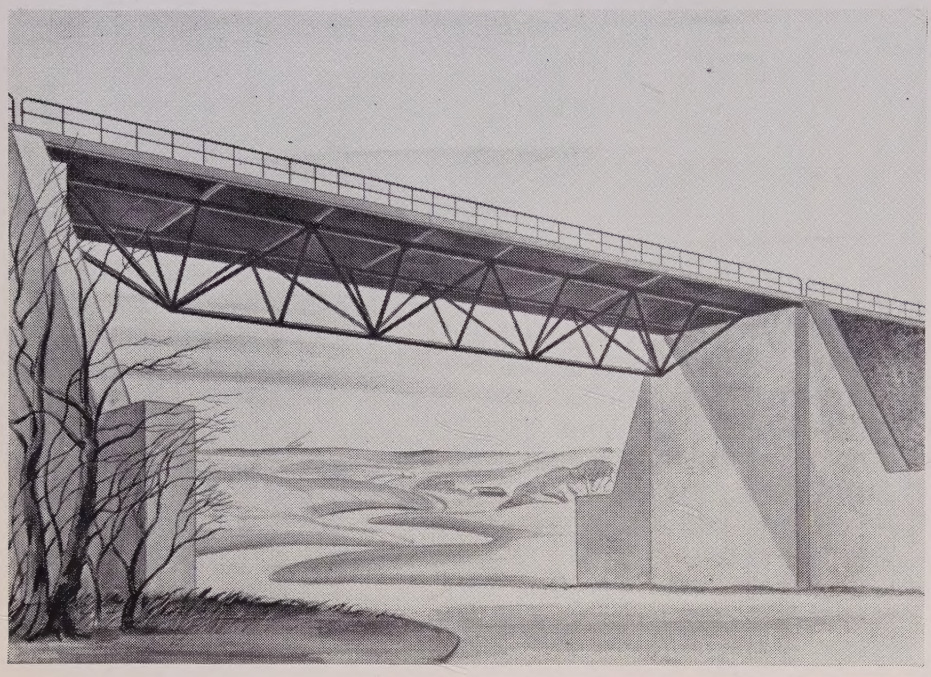
Yes, vision is essential in winning a name but it is doubly important in protecting it, especially a name whose reputation is staked on the commitment . . .

G-10072

YOU CAN BE SURE . . IF IT'S Westinghouse

New Developments

By Henry Kahn, Ch.E. '50



This is an artist's conception of the welded steel bridge which won the first award of $3,000 in the Lincoln Foundation "Welded Bridges of the Future" competition. (Courtesy of James F. Lincoln Arc Welding Foundation.)

Airplane-Type Bridges

A "new look" for bridges may result from a meeting at the University of Illinois last year of Prof. Wilbur M. Wilson, internationally known engineer, and James F. Lincoln of arc welding fame. Professor Wilson conceived the idea that welding could be used in bridge construction, not just as a replacement method for rivets and bolts, but as an entirely new medium of construction. He felt that engineers should be encouraged to think about entirely new methods. As a result of that meeting, a competition for designs of welded bridges of the future was arranged.

The purpose of the competition was to give an opportunity "for determining whether structural designers, freed from present limitations and restrictions, will employ new concepts of economy, performances, and beauty so that substantial progress will result."

The result of the bridge competition may well be to save weight, material, and cost on future spans. Some brilliant new ideas for bridges were presented in the 120 designs submitted in the competition, according to Prof. Wilson, who headed the judging committee. Prof. Thomas C. Kavanagh of Pennsylvania State College won the $3,000 first prize.

Influence of airplane design is shown in the plans for the welded steel bridges submitted this year. Like a frame of an airplane, the winning design is a solid single unit instead of being built-up by bolting and riveting.

More than Meets the Ear

The popularity of amateur programs judged by audience reaction necessitates an analysis of the audience's opinion that is independent of human judgment. The G. E. sound-level meter solves this problem by giving an impartial, scientific indication of noise level.

A range of 20 to 120 decibels permits measurement of almost any noise. Even quiet background noises can be measured with this meter. Tests with the G. E. meter indicate whether noises are obnoxious, or if noise reduction methods are effective.

In factories the meter is used as one of the final tests on heavy machinery. Machines such as turbines operating at maximum efficiency will have a certain noise level. If the machine is not operating at this efficiency the change in noise, though not discernable by the human ear, is easily and conveniently indicated by this instrument.

Noise is distracting no matter what type of work a person is doing. Therefore many employers are beginning to use the sound-level check to keep the efficiency of their employes at a maximum.

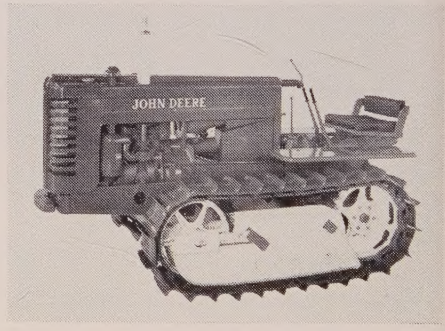
Decreasing Contamination

Use of mortars and pestles made of Carboloy cemented carbide practically eliminates the danger of contaminating materials being pulverized or crushed. The pestles are tipped with the metal and the mortars are solid carbide.

The carbide mortars and pestles are already being used by various industrial and pharmaceutical concerns in their laboratories. The solid hard metal mortar is usually about 3 inches in diameter. It can either be mounted in a holder or placed flat on a work bench. The pestles are made by brazing or soldering a half-round or similar tip of carbide metal onto a "softer" stainless steel holder of convenient size.

New Farm Power

The first track-type tractor to bear the John Deere name, the "MC", is designed to fill power needs on extremely hilly farms, and in orchards, vineyards, woodlands, muckland, bogland,



This track-type tractor is the first of that type built by the John Deere Company. (Courtesy of John Deere)

and in any situation where traction and stability are a problem.

The "MC" pulls a 2- or 3-bottom plow, handles an 8-foot double-action disk harrow and similar loads. Engine is the same 2-cylinder engine as in the John Deere models "M" and "MT" tractors.

Electric starting, battery, four forward speeds, adjustable air-cushion seat,

(Continued on page 31)

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The Tech Presents

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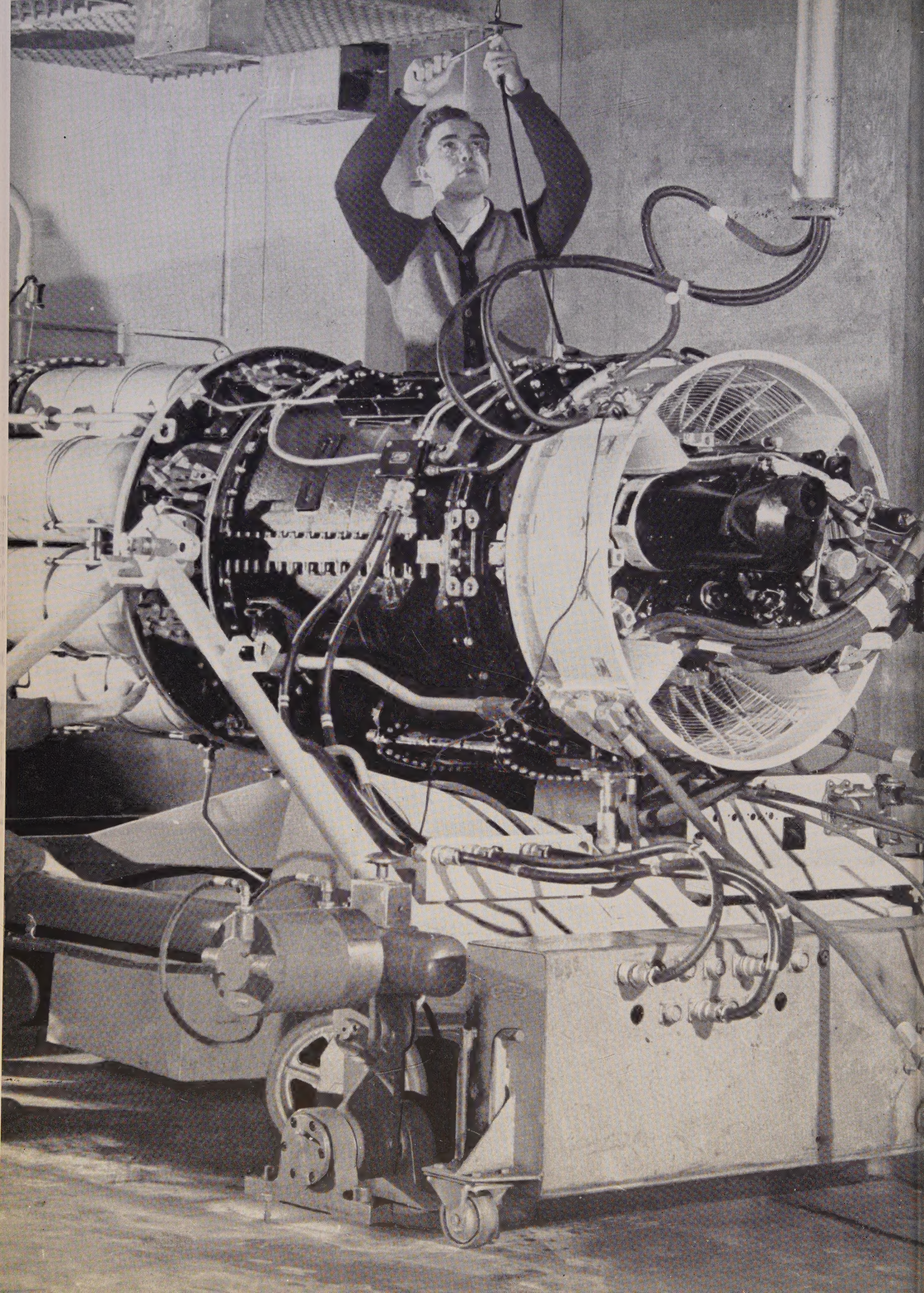
OUR COVER

Electricity is man's most useful servant. Cover cartoonist Ed Lozano depicts typical scenes from the taming of this Djinn as it is done in the E.E. lab.

FRONTISPIECE

This General Electric-built J-47 turbojet, power plant of the North American F-86 speed record holder, is being readied for its initial test. The new engine is rated at 5,000 pounds thrust. (Courtesy of General Electric.)



The Plastic Family Tree

By Dan Keefe, Ch.E. '50

"*Plastic*: from the Greek verb *plasso*, o form; . . . capable of being molded nto various forms . . ." This definition rom Webster may be a little hard to ccept for anyone who has had the misortune of getting his head caught in three-cushion billiard match. Yet the illiard balls are made of a material hat we may rightfully call plastic, hough a cue-ball could hardly be mold- d into something else. The word "plas- ic" was coined about 1930 and is meant o cover a wide range of materials that re either entirely synthetic or result rom a chemical modification of natural- y occurring substances.

After this very brief introduction, climb through the plastic family tree s in order.

Early Development

The first generally accepted plastic was made in 1865 by a Birmingham, England, chemist named Alexander Parkes. He based his product on nitrocellulose (or cellulose nitrate) and it had a marked resemblance to horn or ivory. The name given to the new material was Parkesine and, though it was used in England, it was not exploited in this country until twelve years later.

In that interval an American, John Wesley Hyatt, working along the same lines as Parkes but independent of him, discovered a substance almost identical with Parkesine. The year of this discovery was 1869 and Hyatt's product is known to everyone under the famous name of celluloid. In that same year, another investigator, D. W. Spiel, made the same discovery that Parkes and Hyatt had made; but the honor of inventing and naming celluloid belongs solely to Hyatt.

Two years after the invention by Hyatt, the Celluloid Manufacturing Company was formed; the basis of the process was a gelatinization of nitrocellulose (pyroxylin) with alcohol and subsequent heating with camphor.

While on the subject, it would be well to mention that another plastic named xylonite, which was similar to celluloid, appeared on the market in 1877. There were, of course, many others which were brought out at this time; but all of the products were almost identical with the discoveries of Hyatt and Parkes.

In 1890, a German chemical firm produced a tough, horn-like material which was similar to celluloid but was made somewhat differently. The French made the discovery about the same time and the two interests merged to form the Compagnie Internationale de la Galalith. This new plastic was made by treating casein with formaldehyde; and it found wide application in the manufacture of buttons, knitting pins, brooches, etc.

The last plastic of this particular era which we will mention was called eri-

It seems that the field of plastics has grown up pretty much like an unpruned tree—in all directions at once. However, despite the network of roots in the "fertile earth of chemistry" there is no trunk of unity connecting all the branches together.

This article describes some of the interesting history, properties, and everyday uses of the most important members of this heterogeneous aggregate called plastics.

noid. It was similar to celluloid in its physical properties and made its appearance around the time of the First World War in 1914.

Numerous other plastics belong to the early period of investigation, but details of their development follow along the lines already discussed. It is hoped that the brief sketch given above of the first plastics will serve to give the reader some "new" ideas about the "new" field of synthetics.

Thermosetting Plastics

The year 1907 saw the first really outstanding invention in the field of plastics. Dr. L. H. Baekeland, of the United States, produced the first thermosetting powder in that year. His name is perpetuated in the tradename given to his discovery, Bakelite.

Previously, all attempts to obtain a thermosetting powder had ended in failure in that the product could not readily be molded. Dr. Baekeland's process produced a substance that was fluid at the start of its manufacture and could therefore be poured into molds, or otherwise shaped. Then, when heated, the fluid set to an infusible mass that could not be melted when heated further.

Bakelite is made by heating formaldehyde with phenol in the presence of ammonia; the physical nature of the product is dependent upon the catalyst and the amount of heating employed. Everyone is familiar with Bakelite in some form, whether it appears as a fountain pen, phonograph record, or one of many other equally common items.

It might be well at this point to explain what a thermosetting powder is. A good correlation is available to help in this illustration. Imagine that the molecules of the materials used are very small links which are hooked together in the course of the reaction. Thus long molecules are formed which may be pictured as chains. In the case in question, these long chains have an opportunity of being hooked together (cross-linked) by the remaining small molecules. This second step takes place upon heating in many cases. The material can now be thought of as an extremely complicated network which is quite rigid. It is easy, then, to imagine that as this process of linking the chains together proceeds indefinitely, the product becomes more and more hard. The name "thermosetting" then, means just that; upon heating the material sets and becomes hard.

Glyptals

One of the most important plastics derived from the use of glycerine is that involving phthalic anhydride. The early research in this direction resulted in the discovery of the glyptal resins which were used as bonding materials in mica insulators. These resins were all thermosetting as was the case with most of the early plastics.

In the use of glycerine, the long chains were linked together by the reaction of the three hydroxyl groups in the glycerine molecule. It was recognized that one of these hydroxyl groups would have to be blocked from further reaction if a fluid product was desired. Later work in that direction demonstrated that this could be accomplished by adding a small amount of an aliphatic

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SILICONES IN REVIEW

By Henry Kahn, Ch.E. '50

(Information courtesy of Dow-Corning, and General Electric)

The first organic silicon compounds were prepared in the laboratories of Friedel, Craft and Ladenburg in 1870. The basis of most of our present knowledge about organic silicon chemistry, however, stems from Kipping, who started his 43 years of research on organic silicon compounds in 1901.

There are several ways of making polymer chains containing silicon atoms,

One of the most important limiting factors in the design of equipment has always been the selection of proper engineering materials.

Shortly before the war, steel, iron, nickel, chromium and copper were used almost exclusively, but in recent years aluminum and its alloys have been used in ever increasing amounts. Similarly, silicones have become very important engineering materials. Their uses as lubricants, hydraulic fluids, mold release agents, and electrical insulation, to mention a few, are due to the many diversified advantages.

but only the siloxane or silicone chains (silicon and oxygen atoms appear in alternate position) have become important. Therefore, the other existing chains will be briefly summarized:

1. The silicon-silicon chains are unstable since they are subject to oxidation, thermal dissociation, and hydrolysis.

2. The silicon-carbon chains, such as one involving the phenylene radical (C_6H_4), are quite stable; however, experiment has proved that the chains are quite short. Even though this difficulty can be overcome by hydrolysis and cross-condensation, these polymers have not, as yet, been developed.

There are at the present time two important methods of preparing the organic silicon monomers (R_2SiCl_2) which, though they are usually not isolated, may be considered the starting material for the polymer. From laboratory experience the Grignard reaction is a very logical method. Silicon tetrachloride and a Grignard reagent, such as methyl magnesium chloride in an inert solvent are reacted and recycled until the product is mostly $(CH_3)_2SiCl_2$. The $(CH_3)_3SiCl$ and $(CH_3)_4Si$ have to be separated from the mixture.

Direct Compounding

The second important commercial method is known as the direct method. Here silicon and methyl chloride are reacted in the presence of a copper catalyst. The resulting mixed methylchlorosilanes and silicon tetrachloride are then separated by fractional distillation.

The methyl-dichlorosilane, which results from both of the above methods, is hydrolyzed and then immediately forms polymers by a condensation reaction.

One of the most important things at this point is to get the desired chain length. This can be controlled to a large extent, by the proportion of $(CH_3)_3SiCl$; or if cross-linkage is desired some CH_3SiCl_3 might be added. The usual controlling factors, such as the temperature and viscosity are, of course, also very important in determining the size of the chain.

Emphasis has been placed on methyl-substituted molecules since aromatic groups result in a brittle polymer, while a polymer containing alkyl groups higher than methyl is very pliable.

Oils and Greases

One of the first and the most important silicones to be developed was methyl silicone oil. The repeating unit appears from two to about ten times

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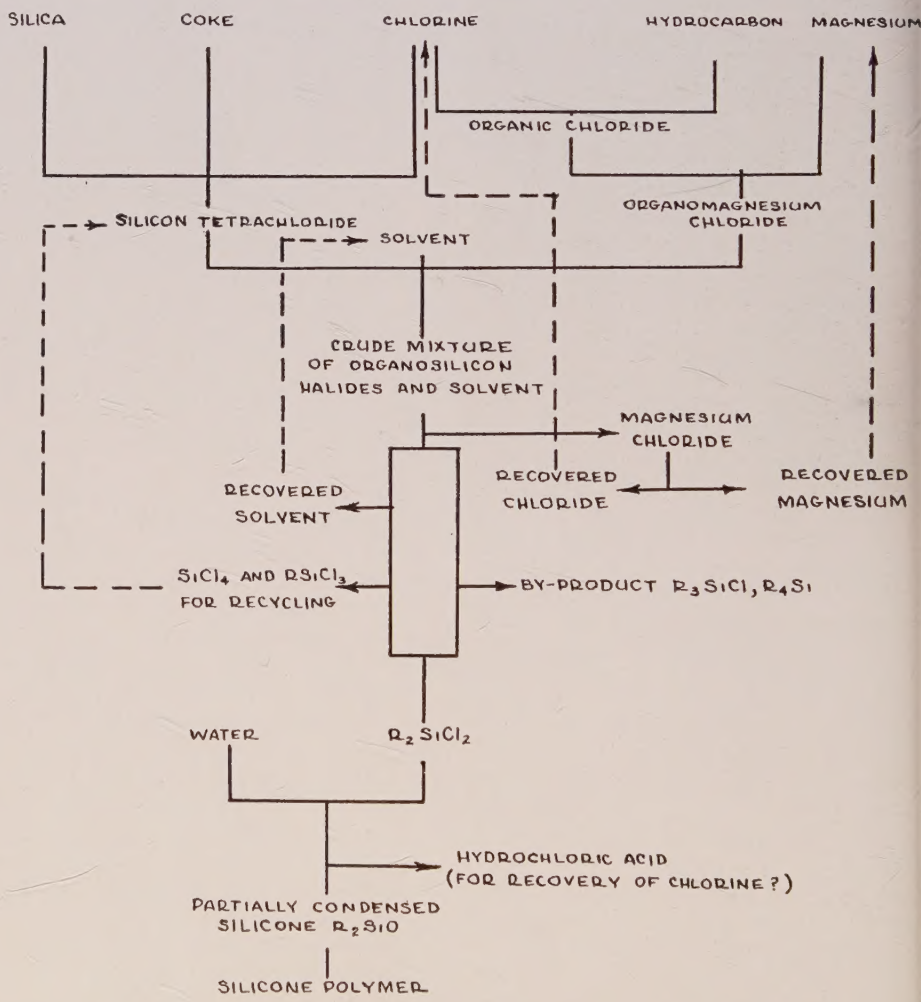


This flow sheet illustrates the Grignard reaction method of producing organic silicon monomers. Organic polymers manufactured by such processes have become important engineering materials.

Head of E. E. Department . . .

DR. JOHN D. RYDER

By Dick Choronzy, M.E. '51

Doctor John D. Ryder, formerly of Iowa State College, is the new head of the Electrical Engineering department. He has succeeded Dr. W. L. Everitt, who is now dean of the College of Engineering.

Since his appointment by the board of trustees, Dr. Ryder has become rapidly acquainted with the various duties required of his office. And he already

DR. JOHN D. RYDER

has become recognizable to many of the engineering students on the north campus.

Dr. Ryder, a personable and relatively young man, was born in Columbus, Ohio, in 1907. He received the B.E.E. degree in 1928 and, a year later, his M.S. degree from Ohio State University.

After earning the latter degree, he obtained a position with the General Electric Company; he specialized in electronic work and the development of thyratrons under H. C. Steiner.

In 1931 Dr. Ryder joined the Bailey Meter Company of Cleveland, Ohio, as supervisor of the electrical and electronic section of the Research laboratory. He holds 24 patents on this work, covering temperature-recording and automatic control applications of electronics. Equipment now being manufactured under these patents include the Bailey "Pyratron" group of devices and the General Electric and Weston photoelectric potentiometers.

While still at the Research department of the Bailey Meter Company, he furthered his graduate education by studying mathematics and atomic physics at the Case School of Applied Science.

In 1941 Dr. Ryder became an assistant professor of electrical engineering at Iowa State College. He continued at that position until 1944, when he became Professor of Electrical Engineering in charge of electronics courses. In that same year he was awarded the Ph.D. degree in Electrical Engineering by Iowa State College. From September, 1944, to April, 1946, he was temporarily professor-in-charge of the Electrical Engineering department.

He became Assistant Director of the Iowa Engineering Experiment Station in 1947. He continued in that capacity until September of this year, when he assumed the position he now holds here at the University.

As can be seen from his educational and practical experience background, Dr. Ryder is exceptionally qualified for the work he is doing here.

He is the author of two textbooks, *Electronic Engineering Principles* (Prentice-Hall, Inc.), and *Network, Lines, and Fields* (Prentice-Hall, Inc.); the former is currently being used in the course, E.E. 340. He has also written many other authoritative papers on D.C. and A.C. motors, vacuum-tube voltmeters, network analyzers, and electronics.

Dr. Ryder is a member of many associations and organizations. He is a member of electronics committee, the education committee, and chairman of the electronics education subcommittee, all of the American Institute of Electrical Engineers. He is also a member of the American Association for the Advancement of Science, and numerous honorary fraternities, some of which are Tau Beta Pi, Eta Kappa Nu, and Sigma Xi.

Dr. Ryder was married in 1933. He has a 12-year-old daughter, Barbara, and a son nicknamed "Mac" who is nine years old.

He has a very interesting hobby—color photography — and owns over 2,000 of his own Kodachrome photographs of western national parks. He also was a radio "ham," operating his own station, WOVDE. When he can find time, he also plays tennis.

As yet, Dr. Ryder has planned no drastic innovations in the department he is heading. The many fine improvements made by the department in recent years makes one believe that it will be difficult to add any startling improvements.

The combination of education and interest in activities marks Dr. Ryder as one of the more distinguished personalities and educators on the campus. And if the Electrical Engineering department rises to even greater heights, to Dr. Ryder will be due the credit.

This is the kind of Prof he ain't.

Over in Africa some of the native tribes have the custom of beating the ground with clubs and uttering spine-chilling cries. Anthropologists call this this a form of primitive self-expression. Over here in America we call it golf.

YOU and the I. S. P. E.

By Connie Minnich, C.E. '51

Have you heard of:

A supply engineer?
A floor engineer?
A cuisine engineer?

It is not unusual to find these types of "engineering" refer to shipping clerks, linoleum layers, and short-order cooks.

Engineering as a respected and time-honored profession is not uncommonly used to disguise a run-of-the-mill job. The above, however, are only trivial examples of the misuse of the word "engineer." Far more serious than these are the cases of men who lay out the plans for large engineering projects and who sign drawings and specifications in the capacity of qualified engineers. Failures of buildings and machines designed by "engineers" leave a dark stigma on the engineering profession.

What is done about such individuals who, though lacking the practice or proper education, assume the responsibilities, trust, and confidence of an experienced engineer? This is one of the many items on the working agenda of the National Society of Professional Engineers.

Undoubtedly, students are familiar with their own specialized professional societies such as the A.S.C.E., A.I.E.E.-I.R.E., and A.S.M.E. Perhaps a few, having heard of the National Society (abbreviated N.S.P.E.) have thought, it an engineering society outside of their own fields.

The N.S.P.E.

N.S.P.E. is not limited to one phase of engineering; it is an association that is comprised of qualified registered engineers in all the actual and related fields of engineering. Unlike the specialized societies, its main function is not *technological* development, but rather the *professional, economic,* and *social* development of the average engineer. To the American people, it is the voice of all professional engineers "in all matters affecting their status as members of a profession and concerning the welfare of the public whom they serve," as expressed by one of the Society pamphlets.

A fairly young organization, N.S.P.E. was formed in 1934 by the joint efforts of four independent state engineering societies whose emphatic objective was the "promotion of the welfare of the engineer." Since that time membership has grown to 22,000 in the 34 state societies. To every member, N.S.P.E. has very much the same significance that the American Medical Association or American Bar has to members of the medical or legal professions.

Following the general outline of the Federal Government, N.S.P.E. is divided into three levels: National, State and Local. The National group is the governing body, it consists of the Board of Directors, one from each of the State societies. From this group the national officers are elected. State societies such as the Illinois Society of Professional Engineers have their own self-governing bodies and are further divided into the local chapters. The organizational chart shown on this page gives some idea of these various divisions of the Society.

And You

The preceding paragraphs have given a rough outline of the N.S.P.E., its founding, primary purposes, and organizational set-up. However, *The Technograph,* as a student engineering publication is naturally interested in this organization from the student's point of view.

For the sake of convenience, take Pat Jones, an average engineering student at the University of Illinois. He could be a friend of yours, your roommate, a casual acquaintance or even you.

Pat, having read the preliminary material of this article, scratches his head and says, "Well, N.S.P.E. sounds pretty good, but it seems to me that only practicing engineers belong to it. I never heard of it having student chapters like the A.S.A.E. or the A.I.Ch.E."

Yes, students can become affiliated by joining a local chapter of the State society, either in the town of their school, which in the case of the University of Illinois would be the Champaign County chapter, or the local chapter in their home town. Student chapters will probably never be organized since one of the basic interests of the Society is the social intermingling of its members. Thus, students are not segregated into their own groups, but are free to become acquainted with professional engineers of all ages and types of experience at the monthly chapter meetings.

This article is concerned with the National Society of Professional Engineers, a fairly young organization which includes professional men in all phases of engineering and which acts as the voice of the American Professional Engineer in social and economic fields beyond the scope of the slipstick world.

"One thing I'd like to know," Pat asks, "is what sort of an examination I have to take before I can become a registered engineer? Does the Society have anything to do with this professional engineering registration? And why do I have to register anyway?"

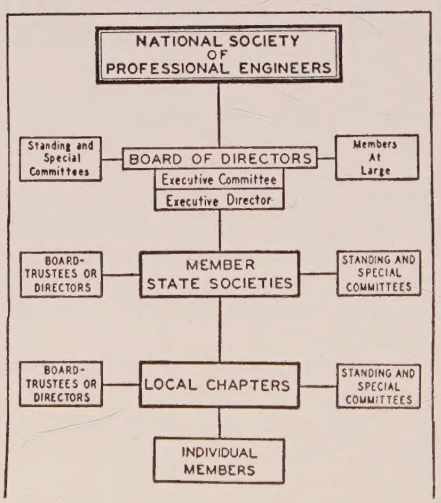
Engineer at Large

Why registration? As emphasized at the beginning of this article, a profession is judged by the work of its people. Thus, the purpose of this professional registration is to draw a dividing line between the qualified members of a profession and those unqualified to practice. As in the case of registered medical men and lawyers, so public recognition is also granted to those licensed by state authority to practice engineering.

What does N.S.P.E. have to do with registration? Contrary to many opinions,

(Continued on page 22)

ORGANIZATION CHART
THREE LEVELS: NATIONAL-STATE-LOCAL



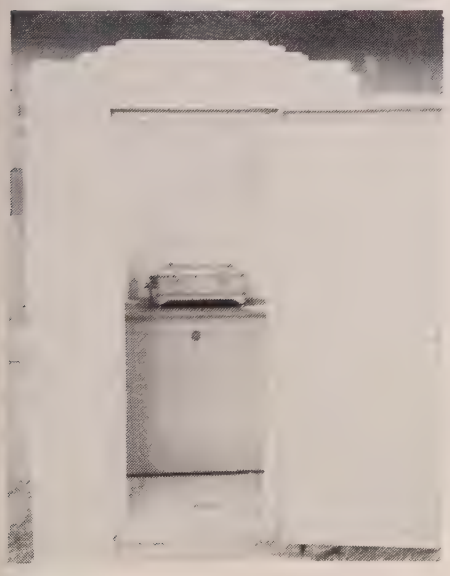
The relationship between individual members, the I.S.P.E., and the other organizations are illustrated in this chart.

BONEYARD BULGE

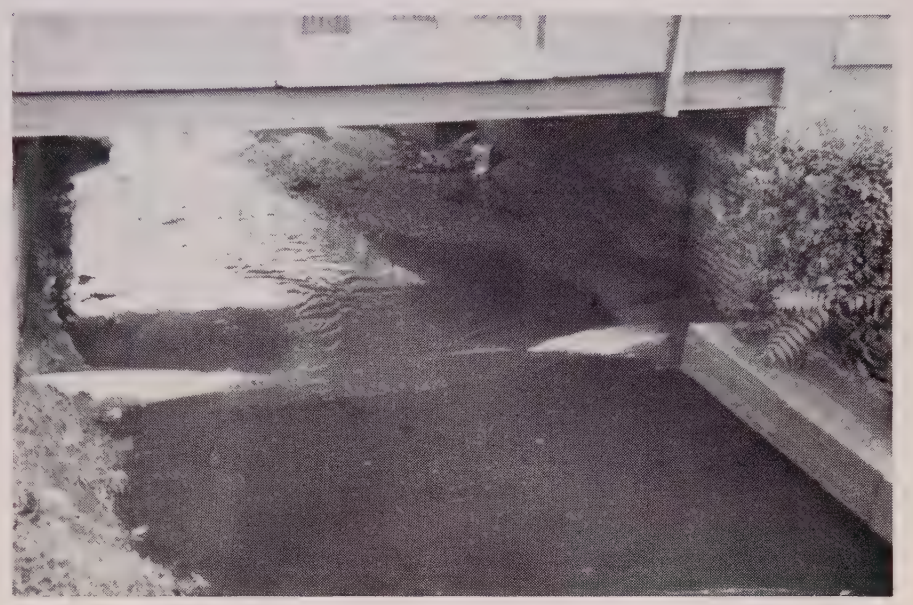
By Dean Felton, C.E. '51

It is a tributary of the Ohio River; it has a drainage area of 5.3 square miles; it owns a U. S. Geological gage station located at Latitude 40° 06′ 40″ and Longitude 88° 13′ 40″. The preceding statement may be used, but the engineers of north campus refer to it as "The Boneyard." "Beloved Boneyard," that is!

The slow-moving, self-cleaning trash barrel of this campus is not always placid. The creek reminds one of Mark Twain's character, "Topsy," in that it apparently doesn't have a source, but just grows. The main supply of water is from rain and "Lake Neil," occasionally resulting in rampages which threaten to wash out most of our engineering campus. The all-time maximum flow was recorded on the afternoon of July 15, 1948. At that time the discharge recorded at the gage station behind Civil Engineering Hall was 345 $ft.^3/sec.$ The minimum, however, was recorded a short time later, when the discharge dropped to 1.0 $ft.^3/sec.$ on September 27, 1948.



The Boneyard flow gage shown here recorded an all-time high and an all-time low discharge rate within the short space of two months last year.



The weir under the E.E. research lab is used for measuring the flow rate of the Boneyard. No floating ping pong balls are visible in this shot.

We hear the Ceramic engineers are preparing to shift into capacity production of bricks. Apparently the city of Urbana is unable to provide the necessary 2x4x8 blocks for repairing the rapidly disintegrating sidewalk along Goodwin street. The ceramists, who don't appreciate walking in muck, are willing to furnish the missing bricks if someone will insert same.

* * *

A new release from the University of Illinois Press, entitled "History of the Development of Building Construction in Chicago," will prove to be a great boon to structural and foundation engineers in or near Chicago.

The book contains a detailed and precise account of the histories of the foundation and structural work involved in the construction of many of Chicago's more important buildings. Although covering all ground between Chicago's founding up until 1948, the book highlights the great building era between 1871, the year of the Chicago fire, and 1915; for it was during these years that foundation design came into being as another major phase of engineering.

Frank A. Randall, the author, compiled this data from his many years of experience as a consulting engineer of Chicago. Mr. Randall has often been a special lecturer to senior civil engineering students here at the University.

* * *

CONGRATS to C. C. Wiley, professor of Civil engineering, on his fourth edition of the Route Surveying textbook. Professor Wiley has rewritten the book which he wrote with the late G. W. Pickels.

The new edition follows the previous book closely as to content; however the material has been brought up to date in methods of usage. Additional material has been written on railroad and highway curves, with other necessary data on various topics included.

The frontispiece of the new edition tells of its dedication by Professor Wiley to G. W. Pickels, a professor of Civil engineering, and a former associate and close friend.

(Continued on page 24)

U OF I
LIBRARY

The Engineering Honoraries and Societies

By Dan Keefe, Ch.E. '50

ENGINEERING COUNCIL

Engineering Open House! That's the main topic being talked over across the engineer's round table. The ball is beginning to roll and it sounds as if this will be one of the biggest events on the campus this year.

The show is, at present, scheduled for next spring; but before then there's lots to be done and every minute is valuable. As things stand now, each of the engineering departments will exhibit a display representative of their field of work. When the big day comes, there will be guided tours through the various engineering buildings and the displays will be demonstrated by members of the societies. It will be an excellent opportunity for everyone to become acquainted with what the different branches of engineering are doing. Don't forget! You're invited and so is anyone and everyone; the more, the merrier. (In fact, you can help!)

All the latest information on the Open House can be read in the *Tech* or can be obtained from your Engineering Council representative.

Have you decided what you'd like to do after you leave Alma Mater? In case you haven't quite made up your mind, the Engineering Council, in cooperation with other councils on the campus, has some news that you'll find interesting. Right here we'll mention the dates: December 5, 6, 7, and 8. Don't forget them!

Wondering what's so important that you shouldn't overlook? It's called the Career Conference and that's exactly what it's going to be: a conference on careers.

Some of the most important men in industry will come here to the University to give informative talks on their type of work. One of the major aims is to acquaint the students with the various fields, and as we said before, if you haven't made a choice yet, this is something you can't afford to miss. Everyone will find that one of the talks will be something he wants to hear.

If you're a freshman in Commerce or a senior in Engineering, there'll be a talk for you; and if you want to hear them all, go ahead—every one of the talks will be interesting, clear, and to the point.

There are a few more deals on the fire that you won't want to pass up, and we'll give you the straight info as soon as possible.

It's going to be a busy year for the Council but they say the engineering outfits have thrown out the word *impossible*—no scientific proof to support its use.

PI TAU SIGMA

Two members of the Illinois Alpha Chapter of Pi Tau Sigma, Joseph T. Ream and Donald R. Tarne, attended the annual national convention of this Mechanical Engineering honorary fraternity which was held this year, October 20 through 22, at Lehigh University, Bethlehem, Pennsylvania.

Representatives from all 41 different chapters throughout the nation were present to discuss the past year's activities and make plans for the coming year.

M.I.S.

The Mineral Industries Society started the semester this fall with their annual student-faculty smoker which was held last month.

At another gathering in October, Dr. William C. Robb, Assistant Dean of the College of Commerce and Business Administration, gave a talk on the Taft-Hartley law and its repercussions today on labor and management. The MIS likes to keep pace with the world today.

The exact line-up for the semester is still a little in doubt, but there'll be a meeting on the second Wednesday of every month. In the way of business, the MIS is talking over the plans for the Engineering Open House and the Career Conference. Mighty Industrious Society.

A.S.M.E. & S.A.E.

The ASME and the SAE combined their many talents to make a big success of their "First Nighter." If attendance at the smoker, October 6, is indicative, the gears will really be turning over this year.

John Menees, president of the ASME, presided and introduced officers and advisers of both student chapters; he also introduced the two guest speakers of the evening, N. A. Parker, head of the Mechanical Engineering department, and Dr. William L. Everitt, dean of the College of Engineering.

Professor Parker, in his talk on "The Engineering College Viewpoint of the Engineering Council and Societies," brought to the fore some of the past of the Council. He proposed the formula: $S = 4M + E$. Literature students would better understand this as: Success equals a knowledge of Materials, Machines, Methods, and Man, plus Energy.

Dean Everitt included a bit of religious philosophy, as well as plenty of wit, in his talk about "The Importance of the Engineering Societies to the Engineering Students and Graduates."

A.I.E.E.-I.R.E.

The electrical and radio engineers got under way this fall with a meeting on October 4. Dean Everitt, dean of the College of Engineering, and Dr. Ryder, head of the E.E. department, were present as guests. Most of the business talked over that night revolved around St. Pat's Ball. A vote was taken as to whether the electrical show should be held at the same time as the Ball, but the results of the poll have not been reported.

I.T.E.

If you should happen to see a student standing calmly in the middle of Green street inviting almost certain death, just forget it. It's probably one of ITE's boys—a traffic engineer, that is. Any time that you can't find a place to park your car, give them a call and they'll tell you all about it.

At their last meeting on October 24, the traffic engineers had Professor Wiley, a member of the ITE national chapter, and Professor Danner, highway engineer, as guests. Professor Wiley gave a talk entitled "Traffic Engineering and the Future," and members discussed a survey on parking at the University. Along that same line, another subject of interest was an evaluation of the parking lots now in use and the possible sites of new ones.

If you ask them how to get through our great little college town safely in

(Continued on page 24)

Introducing . . .

By Dave Cash, Ag.E. '51
and John Huber, Ag.E. '52

CHARLES K. JANKOWSKY

Charles Jankowsky was born in the cement city, Oglesby, Illinois, and attended school in Minonk. Upon graduation from high school in 1934, he went to work for the *CCC* at Galva, Illinois. In 1937, he went to Washington, D. C., to spend a year with the Cartographic unit of the Soil Conservation Service. He spent the years between 1938 and 1942 with the U. S. Engineers in Little Rock, Arkansas, working on soil conservation projects in Arkansas and Missouri.

April, 1942, found Jankowsky in Uncle Sam's army. With the 15th Air

CHARLES K. JANKOWSKY

Force in Africa and Italy, he was a bombardier on a B-17. Following service, in November, 1945, he went back to his job at Little Rock. He soon found that he could advance no higher among the engineers without a college degree, so he decided that the next thing would be a college education.

Jan, as he is often called, entered the University of Illinois in September, 1946. Because of his experience in soil conservation, he considered Agricultural engineering, but he decided upon petroleum production and later switched to Mining engineering, in which he will graduate in February. Charles found college a little difficult at first, after being out of school for 12 years. However, by the second semester, he was working 52 hours a week besides going to school.

Jankowsky prefers rolling land to the flat plains of Central Illinois. He does not have a job yet, but would be interested in almost any type of mining. He is a member of MIS and a student associate of AIME. He was married last January.

PROF. D. G. CARTER

Last year Deane G. Carter, professor of farm structures, received his professional degree of Agricultural Engineer, awarded by the University of Illinois. This was the first and, so far, the only degree of this type.

Born in Missouri, Mr. Carter attended Iowa State College, where he received his B.S. degree in 1915. He spent about two years with Jamesway, a farm building equipment manufacturer, and three years on the staff at Iowa State College. The next year, 1919, he organized a department of Agricultural Engineering at North Carolina. Mr. Carter was head of the Agricultural Engineering department at the University of Arkansas from 1922 to 1941. He came to Illinois in 1941.

Professor Carter is a member of Tau Beta Pi, Alpha Zeta, Sigma Xi, and Gamma Sigma Delta. He has written two books, *Farm Buildings,* with W. A. Foster, and *Family Housing,* with Keith H. Hinchcliff, both of which are accepted as standard college texts.

He has served as a consultant on rural construction, building design, and housing, and as a collaborator with various government agencies. Dr. Carter is chairman of the Research committee on Farm Housing for the North Central states.

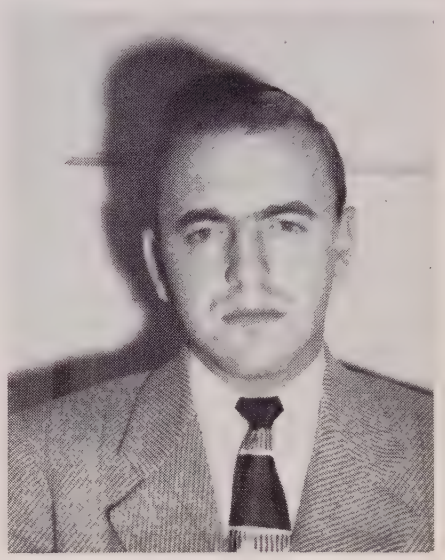
His interests in students is shown by his work on the graduate program in Agricultural engineering, and by his personal counseling and aid in the registration of students in the Agricultural engineering cirruculum.

DEANE G. CARTER

GIRARD GOLDEN

Girard Golden is a man worth meeting and getting to know well. He is a chemical engineer in his last semester.

Not to be content with a mere B.S. degree, he plans to continue his studies and obtain a Ph.D. From the looks of his 4.5 average he will have no trouble in fulfilling this ambition. After that



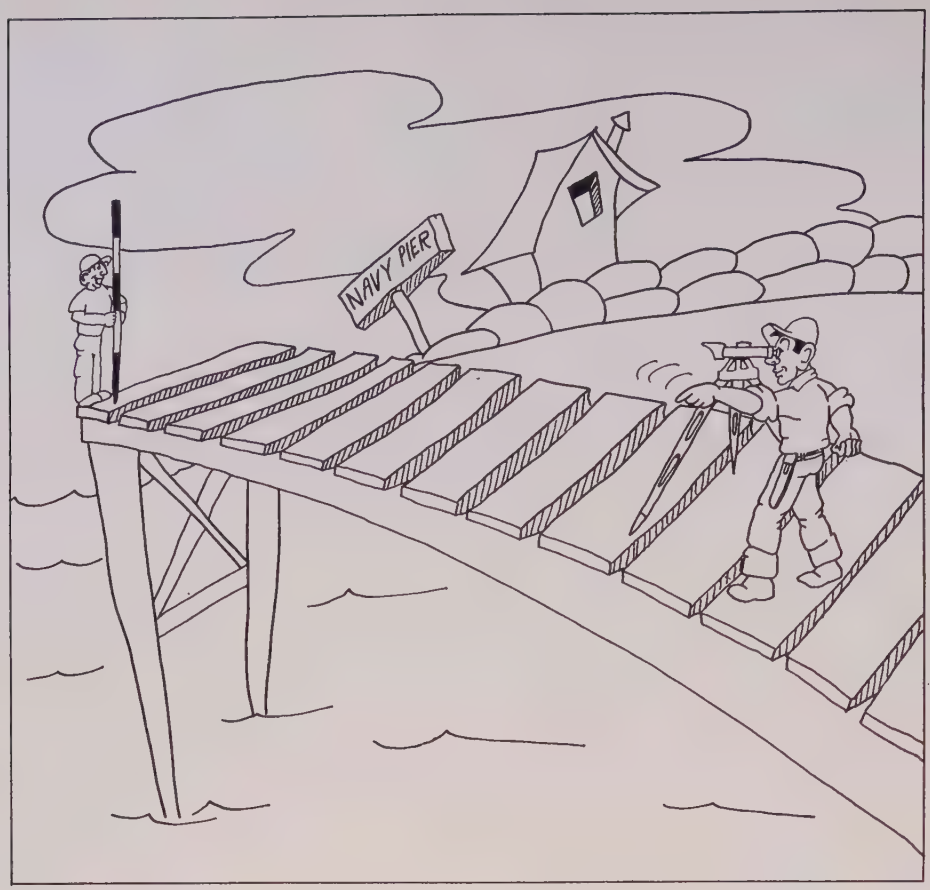
GIRARD GOLDEN

he will be interested in the production phase of chemical engineering work.

Back in '44, about two weeks after graduating from high school, Girard joined the army reserves and went to Princeton University under the A-12 plan. Following a year and a half there and five months of regular army duty, he attended the North Carolina State College for one semester. He was discharged in October of '46 and came to this great institution of learning the following February. He was a member of the Newman club for a year and is, of course, a student member of the A.I.Ch.E.

Girard's father is an insurance and real estate salesman in Rochester, N. Y. A younger brother has also chosen the engineering profession and is studying at Alfred University in New York.

Despite the fact that Girard is an engineer and has been in the upper three per cent of his class for two years, he is not an intellectual bore. Gifted with an engaging personality, Girard is a very eligible bachelor.



In This Corner... NAVY PIER

ENGINEERING SOCIETIES

By BOB KING, C.E. '51

A.S.C.E.

The student chapter of the American Society of Civil Engineers had as speaker at its first meeting in October Mr. R. Salter, an outstanding engineer, working with the city of Chicago. Mr. Salter was formerly the society's representative in the Midwest. He chose as his topic, "Filtered Water for Chicago."

At a business meeting held recently, the following men were elected to office:

President, Stan Gerut; Secretary, N. Baranovich; Outside Representative, R. C. King; and Social Chairman, Dale Carr.

The society also set up a fall program of eight meetings for the coming school year, in addition to the usual social events.

A scholarship of fifty dollars, offered last year by the society, was awarded to Mike Whittington and Bob King. The checks were presented to these men at camp where the money came in handy.

Mike Whittington and Bob King were at summer surveying camp when their A.S.C.E. scholarship checks were presented to them.

NAVY PIER STAFF

Bob King.....*Editor*

Ronald Sak.....*Asst. Editor*

John SoloRio.....*Bus. Mgr.*

Associates

Clarence Niebow Ed Bayl

Mr. Ogden Livermore, Sponsor

A.S.M.E.

The first meeting was held on September 27, where general business was discussed and future plans made. On October 11 the society held its second meeting which consisted of a movie and general business. Tentatively, four field trips to various concerns in the Chicago area are being planned by the field trip committee.

The group of new officers consists of Irving H. Hallberg, president; Leon C. Hummel, vice-president; J. Roy Wilhelm, treasurer. They are planning as full a program as the society experienced last semester.

Vacant lots and vacant minds usually become dumping grounds for rubbish.

* * *

Some men dream of being something; others stay awake and are.

* * *

In the footprints on the sands of time, some people leave only the marks of a heel.

* * *

A man is never too busy to talk about how busy he is.

This is for YOU!

On December 5, 6, 7, and 8, the first annual Career Conference will be presented at the University of Illinois. The purpose of this Conference is to give YOU a complete first-hand account of industrial and professional occupations.

Speakers from nearly all fields of endeavor, fully representing the University colleges and schools, will be on the campus during the Conference week to give YOU precise information about vocations that YOU may be interested in. These speakers will be the men most capable of informing YOU about careers. They have been recommended by the deans of the various colleges and the heads of departments. Sixty-four prominent men have been contacted, and many of them have responded with interest and a desire to help in this very worth-while Conference.

Each speaker will inform you of the complete career situation in his respective field. The following items will be included in his talk:

1. **Job opportunities**
2. **Promotional opportunities**
3. **Preparatory training**
4. **Specialization**
5. **On-the-job training programs**

The idea for this Conference was originated about two years ago by Phi Eta Sigma, Freshman men's honorary, and the YMCA. It has been in the process of development and organization since that time. With the advice of the YMCA and the approval of the deans of the colleges, University funds were secured for the presentation of the Conference this December.

The administrative work for the Conference is being done by students of the following organizations:

Engineering Council, College of Engineering
Commerce Council, College of Commerce
L.A.S. Council, College of L. A. & S.
Junior Bar Association, College of Law
Journalism Forum, College of Journalism
Education Forum, College of Education
Agricultural Council, College of Agriculture
Phi Epsilon Kappa, Physical Education School

Remember, you slipstick shuffler, you electrician, you grease monkey, and you, too, plumber! YOUR career will be better because of the Career Conference

Secondhand First-Aid?

"The University assumes no responsibility for accidents that may occur." A sign bearing these words of warning gently reminds you to be careful around the furnace in the foundry.

Suppose that on the morning of October 22 you were standing within five feet of this sign, but burned a finger despite its warnings. You would have descended 10 feet of stairs, and walked, or ran, at least 60 feet to a first-aid box. It is assumed, of course, that you knew into which dark corner to look, so that you could go directly to the first-aid cabinet.

After opening the door of the dirty case, you found:

1 bottle—spirits of ammonia
1 bottle—green soap
1 bottle—aluminum acetate
1 bottle—3% iodine
11 applicator swabs
1 enameled pan
1 box cotton
1 tourinquet
4 rolls gauze bandage
6 gauze compresses
tape.

What did you do? Start throwing on bottles and bandages? Run over to the Health Center and wait for treatment? Say "Nuts" and go back to work at the furnace?

Had your intuition worked miraculously (or if you were a good Boy Scout), you would have used the aluminum acetate solution. Then you would have looked for a picric acid compress to tape over the burn; and you would have received proper first-aid treatment.

However, if the aluminum acetate failed to jump into your hand when you opened the door, you would have received absolutely no hint that it was intended for burns like yours.

The label on the ammonia bottle said, "dilute, 1 teaspoon to 10 teaspoons water." (Who wants to fuss with teaspoons in an emergency?) The iodine was in a clear white bottle without the customary POISON greeting. Of the 11 applicator swabs, four were protected and clean, four were open and exposed to the dirt, and three had been used once and were waiting for a second time through. The cotton box was open, tape supply was insufficient, and the picric acid compresses had recessed. The tourinquet carried the dangerous directions, "twist until bleeding stops." The enameled pan? . . . it must be provided to keep the blood from dripping onto the floor!

Twenty first-aid boxes throughout the engineering campus were checked on the eventful day that you burned your finger. All were dirty by the "white glove" test. No mice ran out of the corners, but the cabinets were about that sterile! Seven used applicators were found contributing to contamination. Probably seven ungrateful beneficiaries were resible. Or did they leave their last testimonials in the first-aid cabinets?

In six first-aid boxes the ammonia bottle specified dilution before using. If the Health Service supplies a uniform concentration to all ammonia bottles, there should be uniform labels. And it's a bit foolish to put out anything that can't be used directly.

Despite the fact that ultra-violet light increases the activity of iodine, Dr. Beard, director of the Health Center, seems to consider clear white bottles good enough to contain the iodine in the first-aid cabinets. Apparently others have different opinions, because it is sold in brown or blue bottles.

According to Dr. Greenwood of the Health Center, green soap is good for wounds. Several of the bottles say the opposite; some say "for external use only"; some say "poison." Maybe the color (green to yellow to red) doesn't matter, but the label does! Is it or ain't it?

All bottles that are poisonous should be labeled POISON. One of these days we'll hear of someone taking ammonia to cure an acid stomach!

RAY L. HAUSER
Editor

•

CONNIE MINNICH
Associate Editor

the Illinois Technograph

The first-aid boxes are not plainly marked; the white cabinets don't stand out from the usually yellow walls. In the new M. E. building there is no distinguishing marking whatever to tell you what lies behind those mirrors in the corridors. A mirror on a first-aid cabinet is all in the bathroom, but in the corridors, safety, rather than vanity, should be the objective. (This is no fault of the Mechanical Engineering department. They merely requisitioned the Health Center to install the cabinets and did not not choose the style.)

In the new E. E. building the contents can be seen, but the cabinets are set back into the walls. Thus they can't be easily identified from afar.

Only in Talbot lab was any semblance of first-aid instruction found. A small card on the door of each cabinet gives specific directions for using each of the materials inside. Most of the equipment was fresh and clean —and the green soap was green.

First-aid treatment for burns seems to be particularly lacking in the metal heat treatment laboratory and the ceramics kiln room. Apparently burns are not uncommon in the former—the aluminum acetate bottle outside the heat treatment lab was empty. It takes almost a 100-yard dash from the kiln room to get to the butesin picrate in the Ceramics building.

And then there is the Chemistry department. Hats off for a first-aid cabinet in every student laboratory. But Dr. Roger Adams can eat 'em, feathers and all, 'cause the cabinets are *locked.*

Why, Dr. Adams, *why?* Do chemistry students know less about first aid than others? Are the key-carrying instructors given special instructions? Would the chem students steal the contents? . . . then why isn't the fire blanket in 250 Noyes locked up too? Or would the first-aid supplies be used up too fast if everyone could easily get his own treatment?

Last spring three students went to McKinley hospital from Organic lab, Chem 237. Yes, the instructors were on hand when each of the accidents happened; but it would often be faster to run down the corridor to the "free" first-aid station than to run over to Nick's to get the instructor.

Furthermore, the Health Center recommends no locks; and they won't fill the bottles unless specially requested by the department.

The system for maintaining the first-aid stations is almost a pass-the-buck affair. About every two weeks the Health Center sends out someone to fill the bottles; standard first-aid equipment is used throughout. However, each department has to requisition for any items that might be missing or that need replacing.

But how do they know if a bottle of iodine needs replacing? They usually don't! No bottles are dated when installed or when filled. (They don't even know when to celebrate the first anniversary!) It seems that no periodic check is made on the quality of contents. The green soap could turn back to green, the aluminum acetate could precipitate out, and ammonia could blow its top; or "will it take death?"

The Health Center and the departments should either define the obligation or make plans for better cooperation. Let's make the first-aid stations shout! Let's provide correct labels and directions for usage, and keep tabs on the filling dates! And, please, let's open the doors, Roger! —R.L.H.

PLASTICS . . .

(Continued from page 7)

acid to the glycerine before it was used. The result of the investigation produced what are called the modified glyptals which find wide usage in paints and coatings.

In 1919 Dr. Fritz Pollak began a detailed investigation of the plastics that might be obtained through the use of urea and formaldehyde. The real object of his search was a substitute for glass but he was unsuccessful in this endeavor.

He did show, however, that the plastic obtained from the reaction could be used as a molding powder when suitable fillers were employed. The products of the reaction were thermosetting and some manufacturing of them was started in 1924. Dr. Pollak's work showed, moreover, that the amino-plastics could be used successfully; a few years later, another famous man in plastics was to show just how successfully.

Thermoplastic Polymers

From the beginning of plastics in 1865 until 1929, the bulk of the research carried out produced only materials which were thermosetting. It was in that dark year of the "Big Crash" that a new type of plastic appeared; rather than hardening when heated, it remained soft and pliable. This new line of research was carried on in Germany, at first, and a few years later in the United States. The subject of the investigations was the polymerization of styrene which yielded a material called, appropriately enough, polystyrene.

The reaction involves connecting the molecules of styrene together; and though there are many catalysts that may be used, heat alone is sufficient. The long chains are formed as in the thermosetting compounds, but little or no cross-linking occurs. As a result, the plastic does not get harder when heated. This is a characteristic of the thermoplastic materials. In many cases, the high molecular weight compound may break down into the individual molecules when heated.

A casual glance through most of the large circulation magazines will yield a number of advertisements for items made of polystyrene. Two of the more prominent names used commercially are Lustrex and Styron. Kitchen utensils, wallboard, and toys are among the most familiar products molded of polystyrene but the list of things made from it is growing every day.

Soon after the work on polystyrene, research was conducted on the polymerization of methyl methacrylate. The tradenames under which this material appears on the market are Plexiglas and Lucite; and in England, the same thing is called Perspex. Mentioning the things that bear one of those names would be stating the obvious. Plexiglas, of course, will be remembered as the material used in the "windows" of airplanes.

The polyvinyl compounds were developed after plexiglas and are known commonly under the trade name of Vinylite. There are, however, many different forms of the tough vinylite plastics; this is also true for most of the plastics.

The vinyl polymers pop up all over the place. That chair in the corner may be covered with a vinyl plastic upholstery material; one form of vinylite gets trampled upon all the time, perhaps the lawn hose is made of vinylite; that shower curtain upstairs may well be made out of vinyl plastic. It's a job trying to avoid the stuff and there's a reason. The plastics hold up better than anything else.

While on this particular group of polymers, a word must be said about one of the relatively new ones. The polyethylene plastics made their debut on the market about 1939. One of the

(Continued on page 20)

DIAGRAMMATIC CROSS-SECTION VIEW OF A

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This cross section view gives you the "inside story" of the most outstanding development in steel tapes in years. (1) Hardened steel tape—tough—flexible—kink-resistant. (2) Rust resistant coating. (3) Multiple coats of electroplating. (4) Hard, smooth, non-glare chrome plating. Will not crack, chip or peel. (5) Jet black markings—easy to read in any light—bonded to steel base—sunk below chrome surface protecting them against wear.

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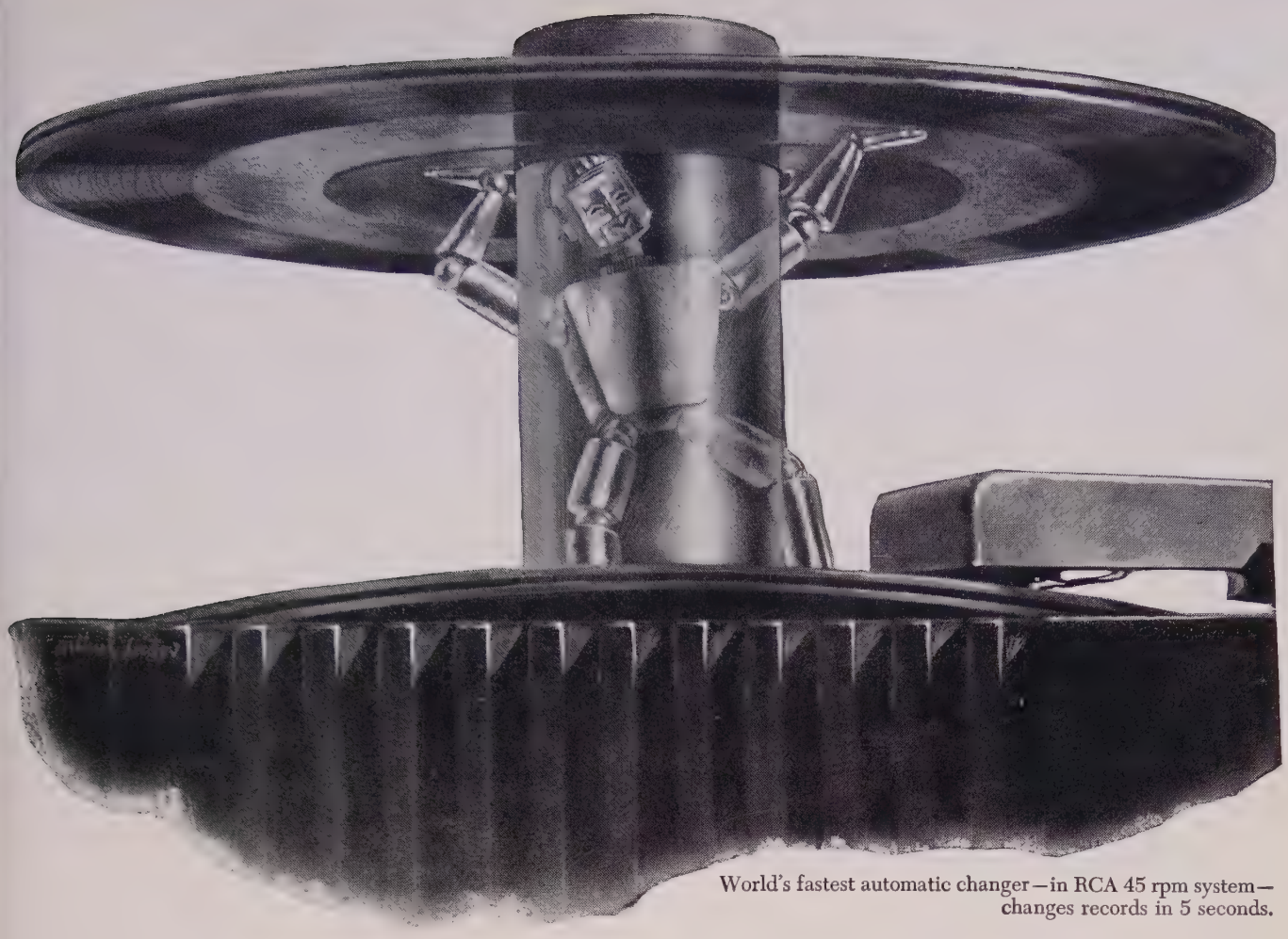

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Quick change artist

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Value of the *research* behind RCA's 45 rpm system—which was started 11 years ago at RCA Laboratories—is seen in the instant acceptance, by the public, of this better way of playing records. Music lovers may now have *both* the 45 rpm system, and the conventional "78."

* * *

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Also many opportunities for Mechanical and Chemical Engineers and Physicists.

RADIO CORPORATION of AMERICA

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PLASTICS . . .

(Continued from page 18)

trade names (used in England) is polythene. The material finds use in co-axial cables as an insulator and has also been used to make wrappers for food that is to be kept in refrigeration.

Synthetic Rubbers

Technically speaking, the synthetic rubbers should not be classified as plastics. They are considered as such, however, because of their similarity through the process of polymerization by which they are made.

The first reported work done in the field was that carried out in 1890 by a man named Tilden. He obtained a rubber-like material by treating isoprene with sodium metal but this appears to be as far as anyone went with this field of research.

It was not until the first World War that Germany turned her full attention to the problem of finding a substitute for natural rubber. They were forced into this action since the Allies had severed the rubber supply route. The stopgap material that was finally obtained and used involved the treatment of butadiene with sodium metal.

The synthetic resulting from the reaction was highly unsatisfactory and after the war there was apparently no extensive research carried out; Germany returned to the use of natural rubber when it was once again available to them.

In 1930, however, the Germans again tackled the problem of synthetic rubber; this time they would not be caught off guard as they were in the first war. The result of this research was Buna S which is made by the co-polymerization of butadiene and styrene. Meanwhile, the United States carried out only limited investigations of the problem of a natural rubber substitute.

In 1941, we woke up one morning and found ourselves cut off from the rubber supply of the East Indies by the Japanese. Work was started at a feverish pace and through a major chemical engineering feat we succeeded in producing 800,000 tons per year before the end of the war.

We now have available a new product called cold rubber that will give longer and better wear than natural rubber.

Nylon

No discussion of plastics would be complete without reference to the brilliant work done by Dr. W. H. Carothers and his assistants. Dr. Carothers began his detailed investigation of thermoplastics in 1927. In the course of his research he discovered cold drawing, and his fibers were the first truly synthetic material ever produced. The mention of his name immediately brings to mind the name "nylon." It should be noted that the name does not mean that all the nylon products are the same thing. There are different types of nylon fibers, depending upon the use to which the final product is to be put.

The list of items made out of some form of nylon is practically a book in itself, so just a few will be mentioned. To the feminine creatures on the campus, the name nylon means hose that wears and wears and wears; it also stands for one of the latest accomplishments: dresses that can be washed in the sink, dried in an hour, and worn as soon as they are dry. There's no ironing required even if the dress has a lot of pleats!

Of course the men get something out of this amazing material, too. There are nylon shirts that dry in little or no time and don't need be ironed; and there are socks that wear like iron. Nylon cargo nets and tow ropes are in use; not only are they longer lasting but they're stronger than steel cables. The Air Force used nylon ropes to pick up and

(Continued on page 22)

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IMAGINE stealing three billion tons of earth every year! That's what soil erosion has been doing. And this gigantic theft has cost farmers billions of dollars. For good earth is *not* dirt cheap.

"Stop erosion!" has become the farmers' war cry. Agricultural agencies have joined the farmers. Together, they have turned to the farm machinery makers. They've asked for bigger and better bulldozers, tractors, graders for necessary ditching and terracing. But to build this super farm machinery takes tougher steel, *new alloys.*

Here is where UCC enters the allied offensive against erosion. Drawing on its vast engineering experience, UCC contributes modern metallurgical techniques and alloys. This co-operation with steel manufacturers helps the farm machinery makers . . . who then are able to give the farmers the equipment they need.

How is the "war" going? The farmers are winning. Dust bowls are vanishing. Sterile lands show signs of life. Yes, the farmers are winning their fight against soil erosion with a combination of new equipment, revegetation and crop rotation.

Union Carbide is proud of its part in this effort. And the people of UCC stand ready to help solve other problems . . . wherever better materials and processes are needed.

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PLASTICS . . .

(Continued from page 20)

tow their glidders, while the Navy used a similar cable to tow huge dry docks around.

Those nylon stockings worn by the campus cuties are not fragile little things. In a newspaper story recently there was the tale about a woman who got her car mired in the mud. A passing motorist stopped, but neither of the two cars carried a tow chain or rope. The day was saved when the lady's stockings were used to tie the bumpers together and her car was pulled back onto the pavement.

One of the limbs on the tree has been purposely avoided because it isn't as strong as might be desired. That one, of course, would be rayon. There are many articles of clothing made out of rayon but the material is not too satisfactory. Most of the rayon fabrics are actually a combination of two or more plastics as the advertisements often say. It is, none the less, an important development.

In the course of the tree-climbing, only the more important branches have been investigated. There are many, many more that could have been. However, it's a very large tree; and it will continue to grow, though not as rapidly as it has in the past few years. The possibilities in the field of plastics are almost unlimited. The way things are going now, that old commercial saw about not accepting a substitute will have to be changed to something like: "If it can be made out of plastic, don't accept the natural thing."

A famous company put it in a few words that are an appropriate ending to this climb: "Better Things for Better Living . . . Through Chemistry."

YOU and I.S.P.E. . . .

(Continued from page 10)

it is not the administrative power of these registration laws for the individual states; these registration laws are enacted by 47 of the 48 states and come under state legislation since public health and safety is affected at every turn by engineering processes. N.S.P.E. is instrumental, however, through its member societies, in fostering new state registration laws and in notifying the State's Attorneys of violators of these laws. One of the objectives of the N.S.P.E. Legislative committee has been to bring about a uniformity of these laws, which vary widely from state to state, through a Model Registration Law.

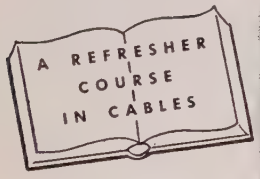
What does a student do to become registered? Many states follow the same registration code that Illinois has: a theoretical examination given immediately after graduation from an accredited engineering school; a training period in the professional field of four years or more; and, finally, a practical examination. Examinations are given two times a year, in May and December.

N.S.P.E. is still a very young organization; but in time, it is hoped, will include nearly all of the nation's engineers, for it is only in unity that the professional engineers will give the greatest service to society and receive their due public recognition and esteem.

Additional information about the Illinois Society of Professional Engineers and the registration examinations can be obtained in the office of Professor H. E. Babbit in 204 Civil Engineering hall.

A quartet is where all four think the other three can't sing.

A great advantage in growing older is that you can stand for more and fall for less.



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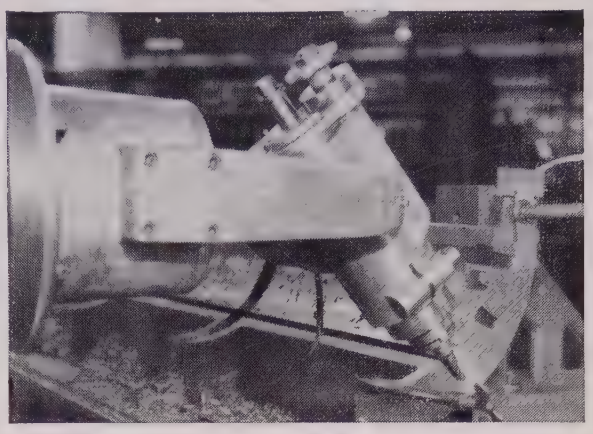
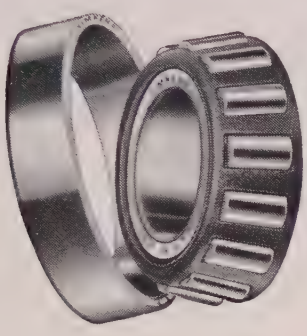
Another page for **YOUR BEARING NOTEBOOK**

New head with a good idea

Designers of a new milling head had a precision problem. They had to give the head a high degree of accuracy that would *last* even under the toughest loads. They answered the poser with Timken® tapered roller bearings—on spindle, pinion and gear shafts.

Timken bearings keep the shafts rigid and accurate under heavy radial, thrust and combination loads, eliminate deflection and end-play, reduce wear on moving parts.





TIMKEN® bearings do 9 out of 10 jobs better

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Some of the important engineering problems you'll face after graduation will involve bearing applications. If you'd like to learn more about this phase of engineering, we'll be glad to help. For additional information about Timken bearings and how engineers use them, write today to The Timken Roller Bearing Company, Canton 6, Ohio. And don't forget to clip this page for future reference.

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SOCIETIES . . .

(Continued from page 12)

a car, you'll probably get the answer: "It's Tough, Eh?"

A.I.Ch.E.

The chemical engineers, all dressed up with a new building that they can't get into yet, have things pretty well lined up for the fall term. They started off the year with a smoker at which the faculty members were introduced, Open House business was discussed, and a prodigious amount of smokes were smoked. At a meeting last month, Dr. John Bailar, head of the job placement department, spoke on employment and what to expect when you try to get same.

On the evening of November 9, Mr. M. H. Arveson, technical director of the Indoil Chemical Company, spoke on chemical patents. Mr. Averson's talk was especially prepared for presentation before young technical men.

Coming up, on the night of December 7, are two motion pictures. The first features Alan Ladd and Janet Shaw in "Unfinished Rainbows," while the second goes under the title of "Test Tube to Tank Car."

The latest word from Henry Kahn, president of the AIChE, is that there may be a party later in the semester. Rumor has it that "appropriate refreshments" will be available in sufficient quantities for all.

Don Engelbrecht, AIChE banker this fall, says that he'll be more than glad to see anyone who wants to pay his dues. Don can be found in 50 Noyes Lab most of the time; and, if you don't see him right away, look into the packed tower.

A.F.S.

The American Foundry Society took care of their organizing early last month, so they got off to a good start. This wasn't such a bad deal they thought, so on the 26th of October they held a dinner. Perhaps that explains some of the well-fed looks around here.

Paul Green, president of AFS, informs us that the schedule this fall includes a field trip, a guest speaker, and some movies. The dates of these events aren't definite as yet; but if you make a practice of reading the Engineering bulletin board on the ground floor of C. E. H., you'll find out well in advance what the plans are.

BONEYARD BILGE . . .

(Continued from page 11)

A young engineer, who incidentally was not a C.E., was hired by the W.P.A. to supervise a small project which consisted largely of pouring short concrete retaining walls to reduce soil erosion. The engineer had virtually no experience with concrete but due to the scarcity of jobs did not care to admit it.

One day, while the forms were being removed, the youngster happened to be near. The oldtimers were ready for a real "reaming out" because the face of the new wall was badly pock-marked due to an extremely poor job of concrete placing. The engineer's only comment was, "Well, it will be all right when we get the second coat on."

Any fool can criticize, condemn, and complain—and most of them do.—*Dale Carnegie.*

Life must be worth living—the cost has doubled and still most of us hang on.

A man of few words doesn't have to take so many of them back.

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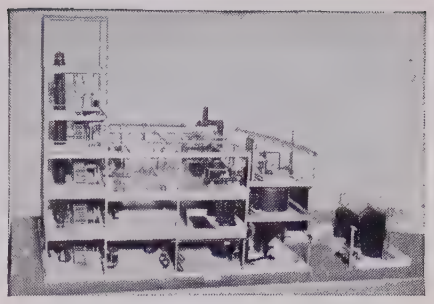
FOR STUDENTS OF SCIENCE AND ENGINEERING



Scale model *of a part of the Du Pont adiponitrile plant at Niagara Falls. Here furfural, an agricultural by-product, is converted into a chemical intermediate for making nylon.*

yarn from corncobs!

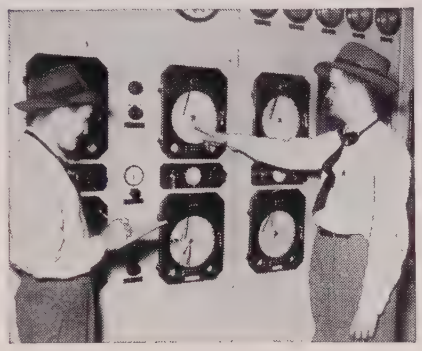
A DU PONT PROCESS CONVERTS FURFURAL INTO A CHEMICAL FOR MAKING NYLON

One of the fascinating things about nylon is the unlikely sounding raw materials that go into it. Popularly, nylon is said to be made from coal, air and water. This is because originally, in developing its chemical intermediates, chemists used benzene (from coal), ammonia (from air and water), and oxygen (from air).

But Du Pont is always looking for new ways of doing things. After the discovery of nylon in 1934, research men immediately began looking for alternative ways of making the two main intermediates—adipic acid and hexamethylenediamine. In 1935, when nylon was still in the laboratory stage and three years before its commercial debut, they started work on the possibility of using furfural in the process.

A. G. Sveinbjornsson, *Ph.D., Organic Chemistry, University of Kansas, 1948, and H. B. Copelin, M. S., Organic Chemistry, Cornell, 1941, studying new furfural derivatives.*

Furfural has been used in the chemical industry for 25 years, but it is little known to the layman. A tan-colored liquid with a faint bitter-almond odor, it is made from a wide variety of agricultural by-products. Among these are corncobs and hulls of cottonseed, oats, rice—all available in practically unlimited quantities from America's farms.



C. R. Dewey, *B. S. Chem., Niagara University, 1941, and J. M. Estes, B.S. Ch.E., University of Missouri, 1937, engaged in production of adiponitrile at the Du Pont Electrochemicals plant in Niagara Falls, New York.*

14 Years of Research and Development

It seems a far cry from corncobs to nylon, and it was. The development from the first small-scale laboratory experiments to the present full-scale plant cost 14 years of time and about five million dollars. But it enabled chemists to produce large quantities of adiponitrile, the compound from which hexamethylenediamine is made, by an economical process which uses natural materials that are in continuous supply.

In the new process, furfural is converted by a series of steps to 1,4-dichlorobutane. The next step explains in part why Du Pont undertook the project in the first place. As producers of cyanides, they had sodium cyanide available for converting the 1,4-dichlorobutane into adiponitrile.

The final product, hexamethylenediamine, is then reacted with adipic acid to make nylon "salt." Still more processing and the salt becomes yarn, and the nylon flake used by the plastics industry.

Opportunities at Du Pont in many scientific fields

This is an excellent example of the interesting work in industrial organic chemistry carried on at Du Pont. It required the technical knowledge and skill of highly trained research and development men, including organic and physical chemists; chemical, mechanical, civil and electrical engineers, and others.

Only a large company with ample resources in men and money could afford to engage in research of such magnitude. To the young college graduate, Du Pont offers the broadest of opportunities in many scientific fields, along with the advantages of working directly with a small group of associates.

Keynote of Du Pont personnel policy is promotion from within on a competitive merit basis. A conscientious effort is made not only to choose college-trained people of promise, but to develop each individual as rapidly as possible.

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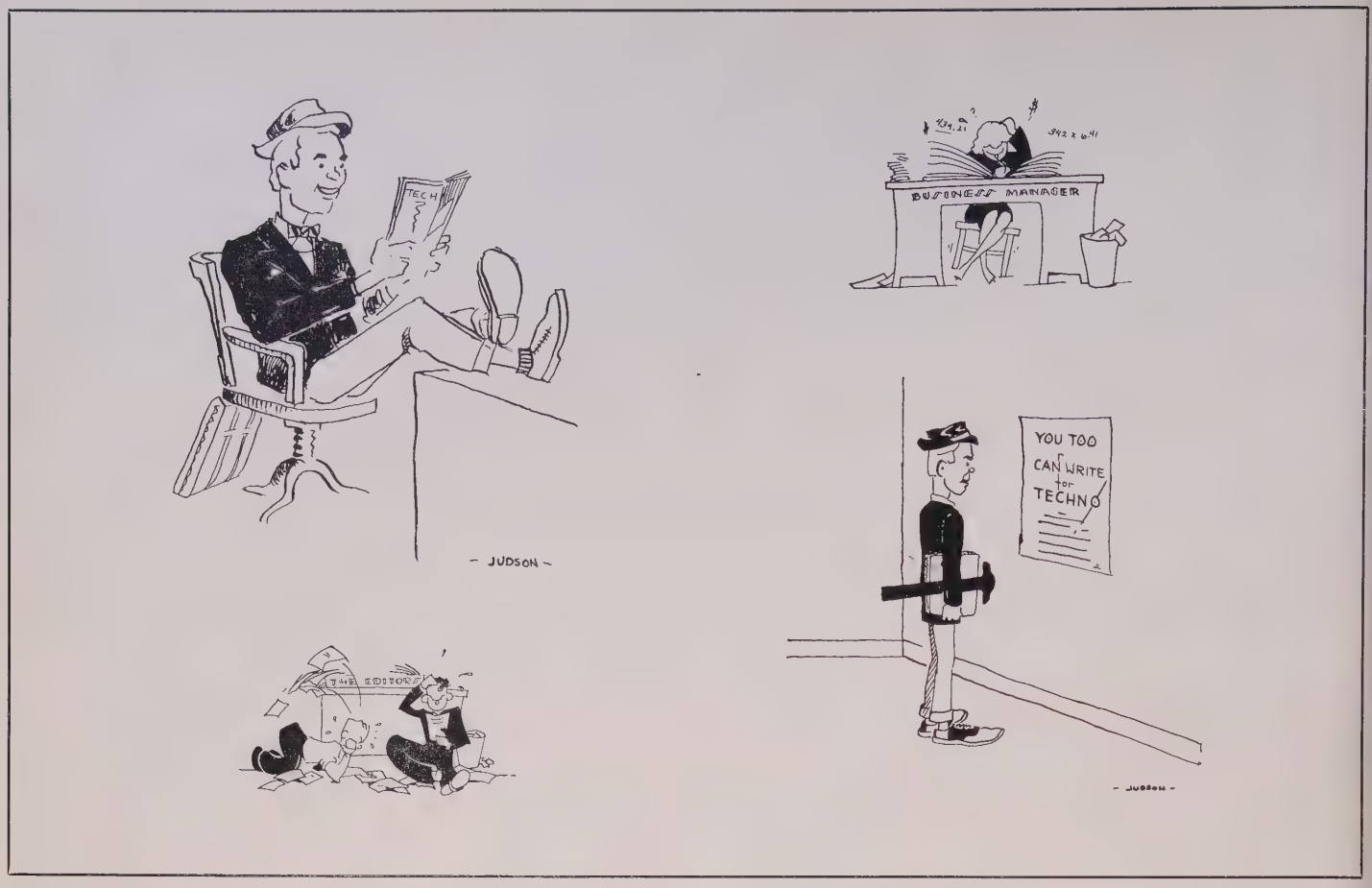

One-Question Exam On FASTENING

Q. *Does it cost more to buy or use fasteners?*

A. It's the cost of using a fastener that counts, not the initial purchase price. So the man with the responsibility of buying or specifying fasteners should make sure that *every* function involved in the *use* of bolts, nuts, screws, rivets and other fasteners contributes to the desired fastening result—maximum holding power at the lowest possible *total* cost for fastening.

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1. Reduce assembly time with accurate, uniform fasteners
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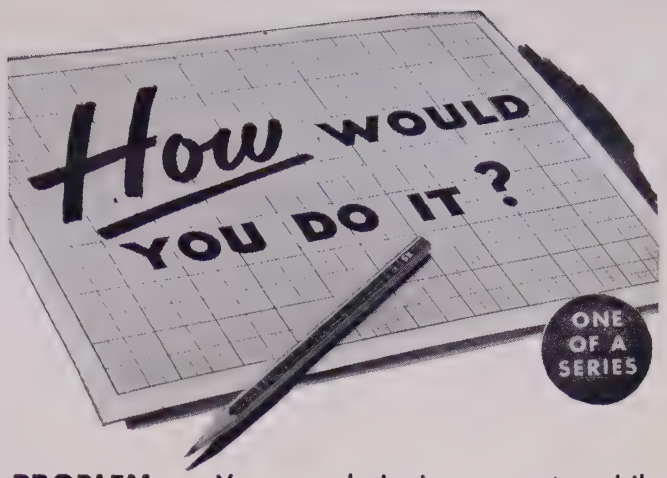
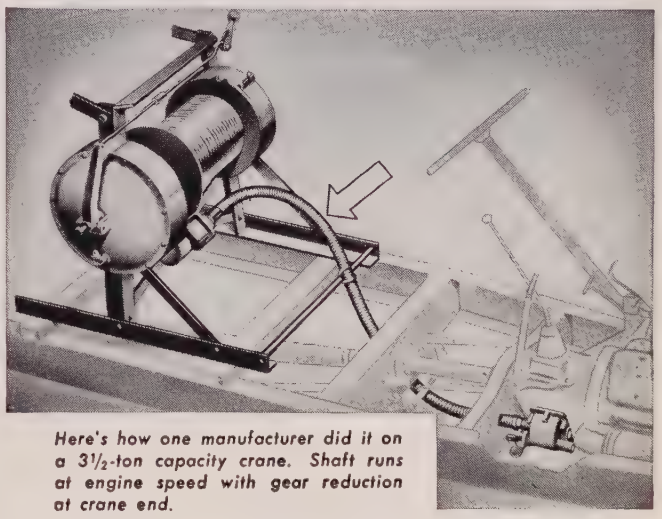


PROBLEM — You are designing an automobile service car with a crane on the back end. You are going to take power from the transmission to drive the crane drum. How would you do it?

THE SIMPLE SOLUTION — Use an S.S.White power drive flexible shaft. Connect one end to a take-off on the transmission and the other end to the clutch which operates the crane drum—simple, easy to install, good for positive, dependable operation.



Here's how one manufacturer did it on a 3½-ton capacity crane. Shaft runs at engine speed with gear reduction at crane end.

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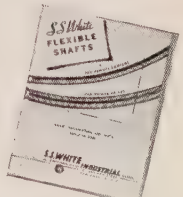

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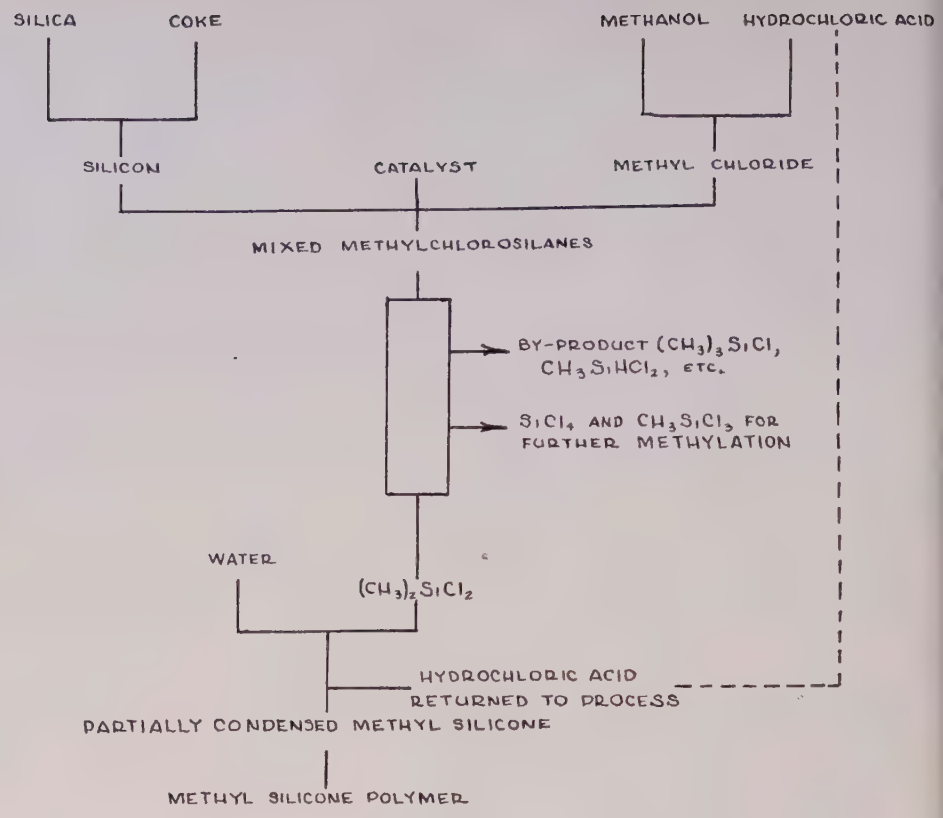
SILICONES . . .

(Continued from page 8)

per molecule. The outstanding properties of silicone oil are nearly constant high viscosity over a very wide temperature range; resistance to oxidation; and water repellency.

Damping vibrations has been one of the most important uses of these oils. In this respect, the fluids are used in delicate aircraft instruments, in shock absorbers and even in the crystal pick-ups of phonographs. In the role of hydraulic fluids these silicones reliably transfer pressure to controlling, recording and measuring devices from objects operating over wide temperature range. Some of the other important uses are as liquid dielectries; lubricants, especially for plastics and rubber which are unstable towards ordinary lubricants; release agents; and as coatings and impregnants.

Greases are formed by increasing the length of the silicone chain (and hence, the viscosity). The outstanding property of these greases is the nearly constant viscosity throughout a tremendous temperature range: from —40° *C* to well over 200° *C*. Certain of these greases, such as stopcock grease and high vacuum grease, find their uses in laboratories. Other special greases have been developed for pressure lubrication, and high temperature lubrication (350° *F*). One can be used in bearings operating at 20,000 *rpm* at temperatures ranging from —95° *F* to 300° *F*.



The direct compounding process is another important commercial method for the production of silicones.

Diverse Functions

The development of totally enclosed ("explosion proof") electric motors and transformers is largely due to silicone greases, and silicone binders and varnishes. The introduction of "fiberglass" increased the operating temperatures of motors, but the organic varnishes which had to be used to bind the fibrous glass still limited the operating temperatures. The silicone varnishes not only overcame this limitation but also rendered the motor water-repellent. Another important factor is that a 10 *hp* totally enclosed motor using this type of insulation is the same size and weight as a regular 3 *hp* motor.

There is a wide variety of household uses for silicone and silicone-treated materials. On every drugstore counter one notices small booklets that brightly announce that they are "Sightsavers." This lens cleaner is a silicone-treated tissue.

Another silicone material which falls into this category is a silicone compound known as DC Pan Glaze. In many bakeries all over the country, DC Pan Glaze is now being used in place of shortening as a release agent for

(Continued on page 30)

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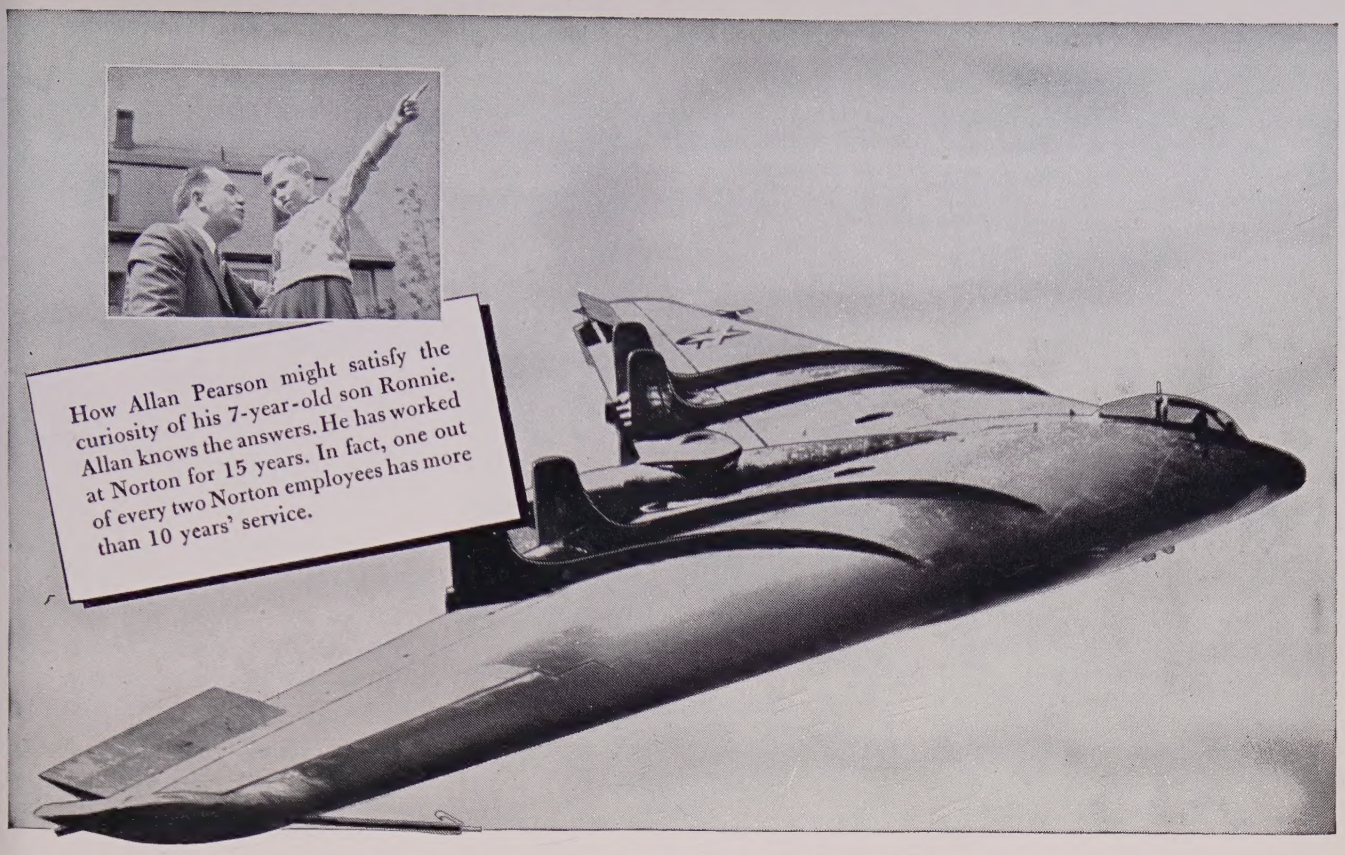

How Allan Pearson might satisfy the curiosity of his 7-year-old son Ronnie. Allan knows the answers. He has worked at Norton for 15 years. In fact, one out of every two Norton employees has more than 10 years' service.

GEE, DAD, WHAT MAKES IT GO SO FAST?

"It's power that does it, son. Power from its new jet engines. Engines built with parts made from today's strongest, toughest metals . . . parts that fit within one ten-thousandth of an inch."

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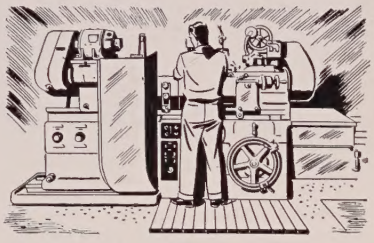
"Then those engine parts are shaped smooth and true by Norton grinding wheels. And those parts fit each other just right. That's because of the sure finishing touch of Norton grinding wheels and machines.



"And when that giant lands, it lands safely because Norton engineering created a special grinding machine that helps make the landing gears' odd-shaped parts fit true and tight and strong."

"Yes, Ronnie, Norton helps make airplanes better. Other products, too. In fact, there's hardly anything man makes that doesn't get a lift from Norton somewhere along the line. That's why I'm proud of my job of making better products to make other products better."

NORTON

TRADE MARK REG. U. S. PAT. OFF.

Making better products to make other products better

ABRASIVES · GRINDING WHEELS · OILSTONES · ABRASIVE PAPER & CLOTH

GRINDING AND LAPPING MACHINES · LABELING MACHINES · NON-SLIP FLOORING

REFRACTORIES, POROUS MEDIUMS & LABORATORY WARE · NORBIDE PRODUCTS

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

SILICONES . . .

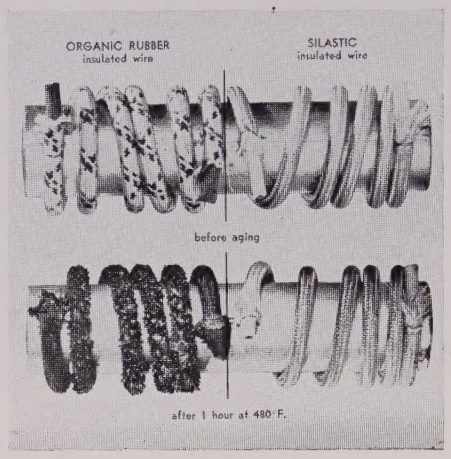
(Continued from page 28)

bread, cakes, etc. The pans are dipped into or sprayed with the silicone and then dried at 70° *F* for one to two hours to remove the volatile, inflammable solvent. After thoroughly curing the silicone coating, the pan can be used 100 to 200 times before a new coating is necessary.

Silicone rubber is a material which has found extensive use in industry because of its heat resistance (—70° *F* to above 325° *F*), chemical stability, electrical properties, and compression characteristics. It is used chiefly for gaskets and as a heat seal. In this way the rubber is used on turbo-jet engines, ovens, searchlights, chemical process equipment, and insulation for electric wires.

A silicone which has found extensive use in the bottling industries is DC Antifoam-*A*. Suppressing foam during bottling and many other processes saves a great deal of time and material. This silicone, though more expensive than other foam suppressors, is still economical.

One of the earliest uses of silicones was the direct application of $(CH_3)_2SiCl_2$ directly to a surface. The surface to be treated is moistened and then placed in contact with the gaseous dimethyl-dichlorosilane; and within a few minutes, the $(CH_3)_2SiCl_2$ is hydrolyzed and polymerized to form a surface of high electrical leakage resistance which is also water repellent. Many ceramic surfaces, steatite parts, windshields and cloth have been treated in this way.



Silastic insulation is far more heat-resistant than organic rubber, as is shown by this test.

Many powdered substances may be treated with this gas to change their properties. Pigments and fillers after treatment are more easily wet by oil. Filter papers that have been treated will repel water, but let hydrocarbon oils pass.

The silicones, though commercially available only since 1943 or 1944, have definitely proved themselves new engineering materials by performing tasks which would have been otherwise impossible.

The trouble with Sunday drivers is that they're on the highways every day in the week.—*Homer Phillips.*

* * *

Honesty is still the best policy, but, strange to say, some people feel they cannot afford the best.

* * *

Light sure travels at an amazing speed until it hits the human mind.

* * *

Flattery is a perfume to be smelled, but not swallowed.

* * *

We've decided that juvenile delinquency is simply the youngsters trying to act like their parents.

* * *

Keeping up with the Joneses isn't nearly as dangerous as trying to pass them on a hill.

Engineering Students . . .

You will find at the Co-Op Bookstore your needs in engineering and art supplies, stationery, textbooks, and general reading.

CO-OP BOOKSTORE

The Bookstore Closest to Engineering Campus

ON THE CORNER OF WRIGHT AND GREEN

NEW DEVELOPMENTS . . .

(Continued from page 2)

ower take-off, fenders, sod-pan, fuel lter, oil filter, oil-bath air cleaner, and enerator are standard features of this ew tractor.

With muffler turned down for orchrd use, the "MC" is only 50.5 inches igh. Approximate weight is 3,875 ounds.

he Playtalk

Another development is the "Playalk," an entirely new type of toy which agnetically records and plays back any ind of song or chatter children care to our into its combination microphone nd speaker. The "Playtalk's" eightnch, paper-thin recording disks are coatd with powdered iron and can be used ver and over again.

A point-in-favor is the fact that the Playtalk" plays without needles. Also, ny recording not fit for posterity can uickly be erased with a permanent maget.

tep-Up in Power

The Boeing XB-47 Stratojet, holder f the all-type transcontinental record, will soon be equipped with even more owerful jet engines.

General Electric's J-47 turbojet, described as the most powerful jet engine in production, will raise the total power of the XB-47 more than 25 per cent. Top speed is placed by the Air Force "in the 600 miles per hour class."

Off at Crack of Dawn

New Milford, Conn., has the world's first major installation of photo-electrically controlled street lights.

This new system covers an area of about one square mile in the New England town, and its 190 G-E *Form* 110 luminaires light seven miles of roads and streets.

The photoelectric control built into the luminaires is set so that the lights go on when the prevailing natural light level wanes to one footcandle. They turn themselves off again when the natural light goes above this level.

Jukebox Television

Before long, television may join you in your own booth at your favorite restaurant. Not long ago, General Electric and AMI Incorporated, a nickelodeon manufacturer, decided to find out whether or not people would pay five cents to see three minutes of television at the dinner table. Accordingly, two "slave" sets, operated by the restaurant's proprietor from a master receiver, were installed in two booths in a New Jersey luncheonette. Only sound volume can be operated on the booth sets, all other controls being on the master receiver.

Women have a reason for thinking a man's got a lot of face. He shaves 20 square miles of face during his lifetime.

* * *

A dollar won't do as much as it used to. Do you know of anybody who does?

* * *

Many a train of thought turns out to be just a string of empties.

* * *

Marriage is a mutual partnership, in which the husband is frequently the mute.

* * *

The absent-minded professor rolled under the dresser and waited for his collar button to find him.

* * *

A college education seldom hurts a man if he's willing to learn a little something after he graduates.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 12, 1946.

Of The Illinois Technograph published eight times during the year (October, November, December, January, February, March, April, and May) at Urbana, Illinois, for October 1, 1949.

State of Illinois } ss.
County of Champaign }

Before me, a notary public in and for the State and County aforesaid, personally appeared Ray L. Hauser, who, having been duly sworn according to law, deposes and says that he is the editor of The Illinois Technograph, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management and the circulation, etc., of the aforesaid publication for the date shown in the above captain, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Illini Publishing Company, 725 South Wright Street, Champaign, Illinois:

Editor, Ray L. Hauser, Champaign, Illinois.

Business Manager, Frederick R. Seavey, Champaign, Illinois.

2. That the owner is the Illini Publishing Company, a non-profit corporation, whose president is C. A. Moyer of Urbana, Illinois, and whose secretary is Manning D. Seil of Champaign, Illinois.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are none.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

RAY L. HAUSER, Editor.

Sworn to and subscribed before me this 11th day of October, 1949.
(SEAL)

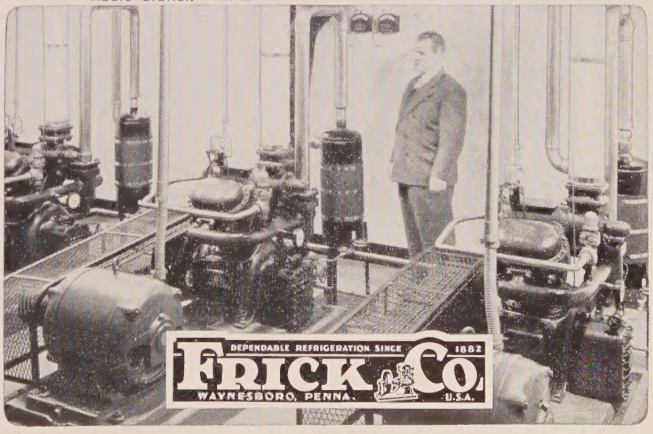
MARGARET E. CAIN, Notary Public.

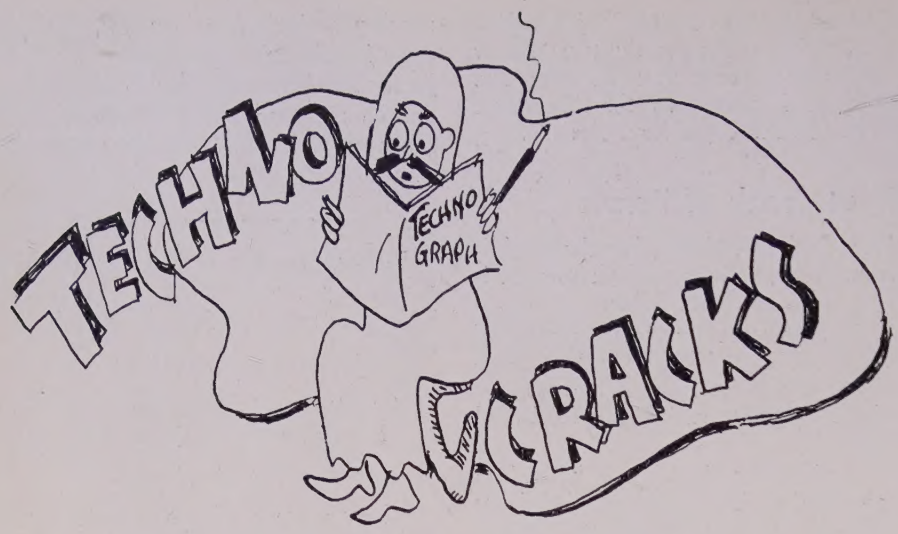
Air Conditioned with Frick Refrigeration

Below: Frick Refrigerating Machines at Radio Station WBAL

The new building of Maryland's largest broadcasting and television station, at Baltimore, is air conditioned throughout with three Frick compressors, each having four cylinders, as shown below. This fine installation won the 1948 Building Trades Award for the Paul J. Vincent Co., Baltimore Distributors for Frick Refrigerating, Ice-making and Air Conditioning Equipment.

The Frick Graduate Training Course in Refrigeration and Air Conditioning, operated over 30 years, offers a career in a growing industry.





First Indian: "Ugh."
Second Indian: "Ugh."
First Indian: "Ugh."
Second Indian: "Ugh Ugh."
First Indian: "Don't change the subject."

* * *

Some business men who say their motto is: "We aim to please," should take time off for target practice.

* * *

Customer: "I'd like 15 cents worth of quinine, please."
Druggist: "Here you are, sir."
Customer (a moment later): "Help, I'm poisoned."
Druggist (looking at the box): "You're right, it's strychnine. That'll be 10 cents extra. Pay me quick, that stuff works fast."

* * *

On a sight-seeing bus going out Jefferson avenue in Detroit, the driver was calling out places of interest: "On the right," he announced, "we have the Dodge home."
A young lady asked, "John Dodge?"
"No, Horace Dodge."
Continuing out Jefferson. "On the right we have the Ford home."
"Henry Ford?"
"No, Edsel Ford."
Still further out Jefferson. "On the left we have the Christ Church." Hearing no response, a fellow passenger tapped the young lady on the shoulder and said, "Go ahead, lady, you can't be wrong all the time."

* * *

Mary, who was notoriously patient, and her husband George, who was notoriously lazy, had lived on an old Kentucky farm for 45 years.

Repeatedly over the past ten years, Mary had asked her husband to prop up the north end of the kitchen floor where the supporting timbers had decayed. George would always sigh, mutter something about waiting for warmer weather or cooler, as the case might be—and go back to sleep in his chair by the kitchen stove.

But the time came when the floor sloped so sharply that even George's flexible old arm chair grew uncomfortable to sit in. Finally, he told his wife one day as she was leaving for town that he guessed he'd have to fix things up somehow.

When Mary returned, the job was done, and George was asleep once more in his chair. He looked so comfortable she hadn't the heart to wake him. Instead, with characteristic patience, the long-suffering Mary swept up the sawdust left strewn on the floor and threw into the fire two little inch-long cylinders of wood that George had carefully sawed from the back legs of his chair.

* * *

A young boy went to school one morning recently with a box under his arm. Reaching the schoolyard, he opened it and began passing out lollipops to his classmates, explaining, "I'm a brother."

* * *

Kissing don't last. Cookery do.—*George Merdith.*

* * *

Two sailors had been drifting on a raft for days when one, losing all hope of rescue, knelt in prayer.
"Oh, Lord," he moaned, "I've led a worthless life. I've drunk to excess. I've been mean to my wife and neglected my children. But if you save me from this, I promise . . ."
"Hold it, Jess," interrupted his companion. "Don't promise anything drastic. I think I see land."

* * *

The only thing that can keep on growing without nourishment is an ego.

Donald and Mary MacTavish decided to adopt a child, and asked the orphanage for a little girl. One was produced and Mary was about to close the bargain when Donald tapped her shoulder.
"Mary," he whispered, "let's take a wee lad. Hae ye forgotten the lad's cap we found in the train?"

* * *

Minister (from the pulpit): "Those in the habit of putting buttons in the collection plate will please use their own buttons and not those from the cushions on the pews."

* * *

Wife (to husband): "I just overheard the best news about the house we're having built. One of the carpenters told another that the whole thing is being constructed with green lumber. Isn't that grand? Now we won't have to buy all that green paint."

* * *

In every one of our universities, there are a number of aggressive, clean-cut young men who are diligently working their dads through college.

* * *

In fairness, it ought to be conceded that the old-fashioned dime novel which is now selling for $2.50 is printed on better paper.

* * *

Every man should remember that it is much easier to live within an income than to live without one.

* * *

Customer: "Will this suit hold its shape?"
Salesman: "Absolutely. Our new spring suits are made of pure virgin wool."
Customer: "I don't care about the morals of the sheep. Will it hold its shape?"

* * *

The worst thing about football is that none of the cheer leaders ever get injured.

* * *

She was one of the British brides, and as the liner slowly docked, she spotted her husband on the dock almost hidden by the beautiful flowers he was holding. She rushed down the gangplank, threw her arms around him and sobbed: "Darling, you shouldn't have bought so many flowers for me."
"Enough of this; help me sell these flowers now!"

* * *

Never shift your mouth into high gear until your brain is turning over.

* * *

The weaker the argument the stronger the words.